THE Journal

FEBRUARY

1953

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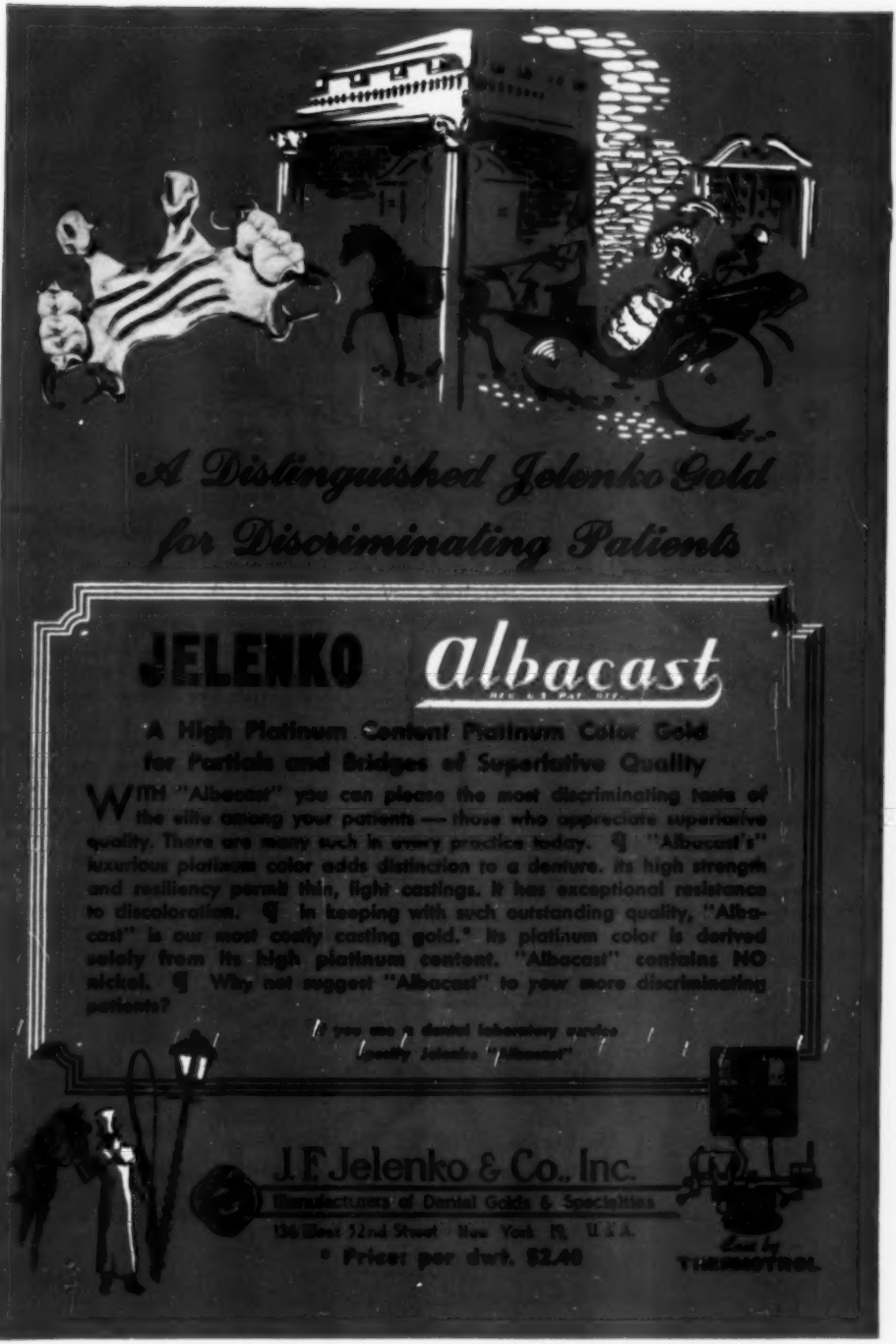
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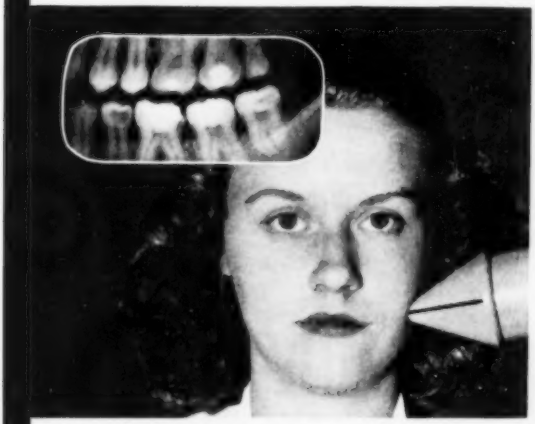

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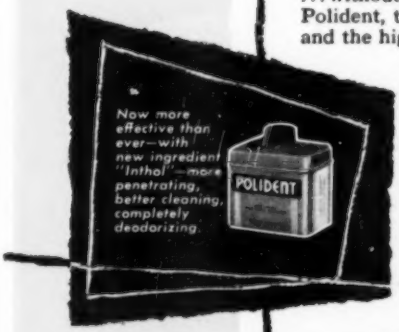
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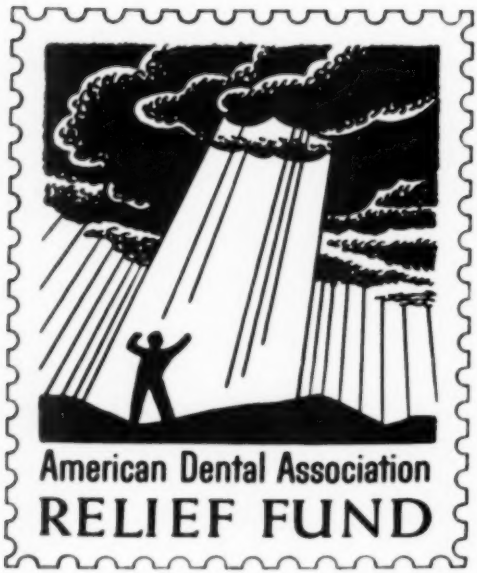

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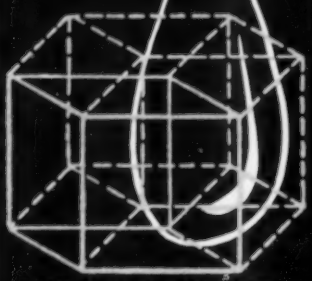

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† *Bragdon, C.: A Primer of Higher Space, New York, Alfred A. Knopf, 1923, Pate 1.*

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Hingson, R.A., N.Y. J. Dent., 30:370 (Oct.) 1950.

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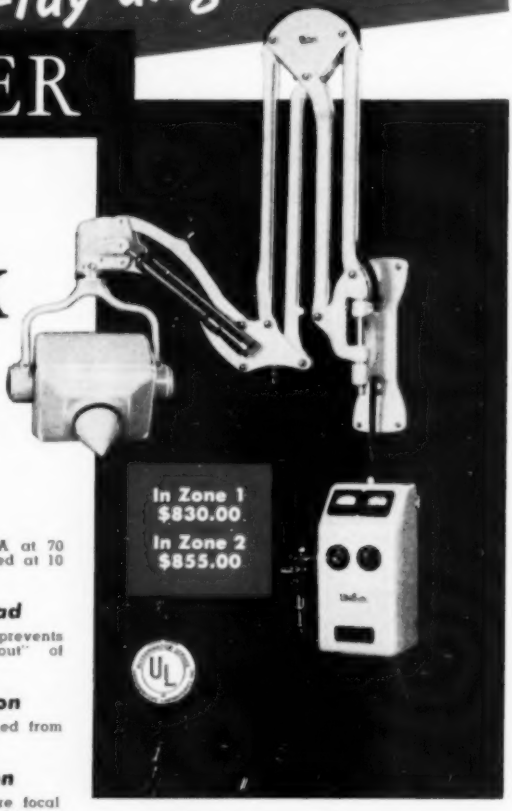

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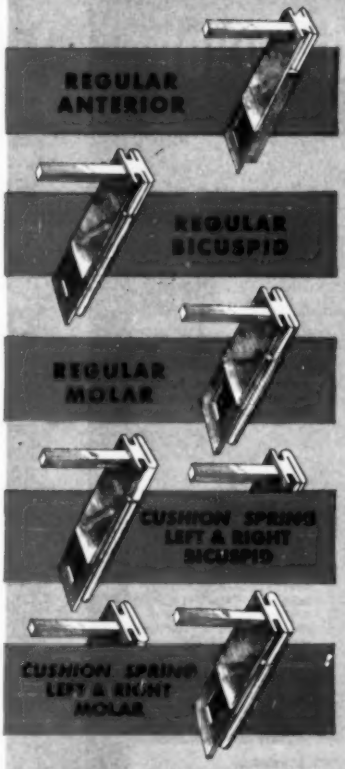

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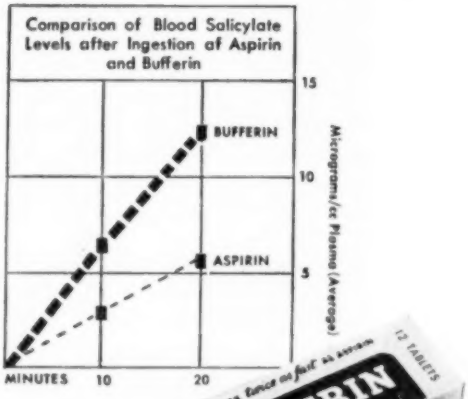

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FEBRUARY 1953 THE Journal OF THE AMERICAN DENTAL ASSOCIATION VOLUME 46 • NUMBER 2

General principles of antibiotic therapy

Robert J. Glaser, M.D., St. Louis

In the broadest sense of the term, a wide range of chemical and physical agents can be classified as antibiotics. The term has been used recently to include animal and plant derivatives as well as antimicrobic substances of microbial origin.[1] Perhaps a preferable term is chemotherapeutic,[2] which is used in this paper to apply to any substance, whether of biologic or synthetic origin, which is effective against infectious agents. The antibacterial chemotherapeutic armamentarium at present includes numerous antibiotic substances; others are now in the stage of laboratory study. Of the chemotherapeutic substances, the sulfonamides, penicillin, streptomycin, aureomycin, chloramphenicol and terramycin are at present the most widely used.

GENERAL CONSIDERATIONS

The criteria on which the choice of an antimicrobic agent should be based include the following:

Efficacy • In a given case where the infecting agent is not immediately, or even ultimately, known, the so-called wide-spectrum antibiotics, aureomycin, chloramphenicol and terramycin, may in some instances offer advantages over penicillin, which affords less broad coverage. On the other hand, when the infectious agent is known or can be predicted with reasonable certainty, a more rational choice of drug is possible.

Chemotherapeutic drugs may in general be classified as bactericidal or bacteriostatic. Both the concentration of the agent and the organism concerned are important, since a drug which in low concentration merely inhibits bacterial growth can exhibit killing power when present in high concentration. Some drugs, for example, penicillin, are bactericidal only for rapidly dividing organ-

Presented before the Combined Section Meeting, ninety-third annual session of the American Dental Association, St. Louis, September 10, 1952.

Assistant professor of medicine, Washington University School of Medicine; assistant physician, Barnes Hospital; chief, Unit 1 (Washington University) Medical Service, St. Louis City Hospital.

1. Waksman, S. A. Microbial antagonisms and antibiotic substances. London, Commonwealth Fund, 1945.

2. Goldstein, Avram. Antibacterial chemotherapy. New England J. Med. 240:98, 1949.

isms and relatively ineffective against "resting" bacteria. Others, for example, the sulfonamides, are inhibited in the presence of pus. It is clear that bacteriostatic antibiotics can be highly effective in the treatment of various infections, a fact which emphasizes the importance of the host response in body defense.[3]

Ease of Administration • The advantages in the use of a drug which is effective when given orally are obvious, particularly in the treatment of ambulatory patients. On the other hand, variation in rate and degree of absorption and local irritative effects may limit considerably the use of the oral route so that it is equally important to have available preparations of a given antibiotic suitable for intramuscular or intravenous use. Particularly useful in parenteral administration is a long-acting, repository form for intramuscular use. As a general rule, much smaller doses of an agent are necessary for parenteral administration than for oral administration.

Toxicity • This criterion is of paramount importance in evaluating a drug. As originally visualized by Ehrlich,[4] chemotherapeutic agents were to be lethal to the infecting organism and innocuous to the host. In actual practice it is doubtful whether any drug fulfills such ideal qualifications. Great variation exists in the frequency of occurrence and seriousness of toxic reactions produced by various drugs.

Toxicity may be manifested by irritative or allergic reactions to the drug *per se* or by effects indirectly attributable to the agent. Nausea and vomiting, which not infrequently are associated with the use of certain antibiotics, can often be controlled by lower dosage or withdrawal of the drug. Among the allergic toxic manifestations are fever, dermatitis and stomatitis, or the more severe or even fatal reactions such as anaphylactic shock, blood dyscrasias and collagen disease. The most common indirect untoward reactions are secondary fungus infections, particularly moniliasis, which apparently result from alteration or suppression of the indigenous flora of the mucous membranes of the oropharynx, rectum and vagina. Diarrhea probably arises for the most part because of the suppressive effect of the given drug on intestinal flora.

Development of Resistant Strains • The rate at which bacteria become resistant to a drug is extremely variable, depending both on the drug and the organism concerned. Though many important facets of this problem remain obscure, it seems likely that drug-resistant strains which arise relatively abruptly during the course of therapy represent naturally occurring variants, the susceptible cells being inhibited by the drug.[5] The less rapid development of drug resistance after long exposure to a drug may not be explicable in the same way. The physiologic differences between resistant and susceptible strains are by no means completely understood.

It is of practical importance in the treatment of a specific infection to employ an adequate dose of drug so that drug-resistant mutants may be decreased or prevented. If drug therapy is unsuccessful in certain infections, consideration must be given to the possibility that the causative organism was drug-resistant before treatment began; if another effective agent is available, it should be employed. Thus, if a staphylococcal infection fails to respond to penicillin, aureomycin should be substituted. Drug-resistant strains are particularly apt to emerge when infection is chronic and long term treatment is necessary. For example, many strains of tubercle bacilli

3. Wood, W. B., Jr. Harvey Lecture, to be published.
4. Ehrlich, P. Address in pathology on chemotherapeutics. Lancet 2:445, 1913.
5. Demerec, M. Origin of bacterial resistance to antibiotics. J. Bact. 56:63 (July) 1948.

develop streptomycin resistance after the drug has been used for one to three months.

Finally, the widespread use of a given agent in a given infection may ultimately result in the development of resistance in all strains, with the result that a different drug must be used in the treatment of the infection. Such a situation now obtains in the treatment of gonococcal infections with the sulfonamides; most strains of gonococcus are sulfonamide-resistant.[6] Fortunately, penicillin is universally effective and is the drug of choice.

Use of Combinations • Since the development by microorganisms of resistance to one drug is independent of their resistance to a second drug, it has been suggested that when two agents are effective against a given organism, both should be used in the therapeutic dosage.[7] It is highly improbable that a bacterial cell would undergo simultaneously two mutations resulting in cells resistant to both drugs. This is the principle on which the use of a combination of streptomycin and para-aminosalicylic acid in tuberculosis is based.

Whether a combination of antibiotics is effective in practice in all instances, however, has been seriously questioned. Recent studies[8] suggest that under certain conditions a combination of antibiotics may be detrimental, even though each drug may be effective when used by itself. The most striking example appears in the report of Lepper and Dowling,[9] in which it is shown that combined penicillin-aureomycin treatment in pneumococcal meningitis is associated with an alarmingly higher mortality rate than that occurring when penicillin alone is used.

Conversely, Hunter[10] clearly demonstrates that in subacute bacterial endocarditis due to enterococci — organisms which are relatively penicillin-resistant — the addition of streptomycin, in itself totally ineffective, greatly enhances the therapeutic results. It is obvious that much additional work must be done in order to define conclusively the indications and contraindications for the use of antibiotic combinations.

Cost • While cost is by no means the major factor in the selection of a chemotherapeutic drug, it is of practical importance when more than one effective agent is available. Cost decreases usually as more efficient manufacturing methods are developed. The initial cost in developing and producing antibiotics is high; if they continue to be used widely, they will most probably become less expensive.

THE COMMONLY USED CHEMOTHERAPEUTIC AGENTS

Sulfonamides • Although in terms of expense and ease of administration, the sulfonamides are particularly suitable for widespread use, their toxicity, the emergence of resistant strains of streptococci and particularly of gonococci and the advent of newer, more effective antibiotics have distinctly decreased their usefulness; their use at present should probably be limited to the treatment of infections due to meningococci, anthrax bacilli and certain enteric organisms.

Penicillin • Penicillin, considered by some authorities to be the most nearly "ideal"

6. Finland, M. The present status of antibiotics in bacterial infections. Bull. New York Acad. Med. 27:199 (April) 1951.

7. Dubos, René J., editor. Bacterial and mycotic infections of man. Philadelphia, J. B. Lippincott Co., 1948, p. 675.

8. Jawetz, E.; Gunnison, J. B., and Speck, R. S. Antibiotic synergism and antagonism. New England J. Med. 245:966 (Dec.) 1951.

9. Lepper, M. H., and Dowling, H. F. Treatment of pneumococcic meningitis with penicillin compared with penicillin plus aureomycin; studies including observations on an apparent antagonism between penicillin and aureomycin. Arch. Int. Med. 88:489 (Oct.) 1951.

10. Hunter, T. H. The treatment of some bacterial infections of the heart and pericardium. Bull. New York Acad. Med. 28:213 (April) 1952.

antibiotic, is effective against most of the gram-positive bacteria which are important in human disease. It is potent also against the gram-negative Neisseria (meningococcus and gonococcus), spirochetes and against some actinomyces. Penicillin resistance has become a problem only in the case of *Staphylococcus aureus,* some nonhemolytic streptococci and the enterococci.

Penicillin lends itself to use by the oral, intramuscular, intravenous and intrathecal routes; but when given by mouth, doses at least five times higher than are used parenterally should be given. The toxicity of penicillin manifested by mild skin reactions is not uncommon, but serious toxicity is unusual. Of great importance is the fact that huge doses of penicillin are accompanied by no increase in incidence of toxic reactions, either immediate or delayed. In this respect, penicillin differs remarkably from the other known antibiotics and indeed from almost every other drug known.

In combination with streptomycin, penicillin has been found especially useful in the treatment of endocarditis; these two agents together afford rather broad coverage also against a number of common infections and hence find favor as a prophylactic combination for hospitalized patients with debilitating disease and for those undergoing major surgery.

Streptomycin • Streptomycin, isolated from *Streptomyces griseus* in 1944,[11] has been found to be effective against many gram-negative bacteria and against the tubercle bacillus. In tuberculosis, it should be employed in combination with para-aminosalicylic acid. It may prove effective also when given with isonicotinic acid hydrazide.

Streptomycin is administered primarily by the intramuscular route; in meningitis it may be given intrathecally. In terms of untoward reactions the most serious problem with streptomycin, especially evident after prolonged use of large doses, has been its neurotoxicity.[12] Vestibular dysfunction and deafness may result. In addition, dermatitis and renal abnormalities may be encountered.

Aureomycin • Aureomycin, isolated from the soil organism *Streptomyces aureofaciens* in 1948 by Duggar,[13] was found to be effective not only against many gram-positive and gram-negative bacteria but also against the rickettsiae and a few of the larger viruses. Aureomycin is particularly useful in the treatment of penicillin-resistant staphylococcal infections. It is usually given orally, but it may be used intravenously. Gastrointestinal disturbances, especially diarrhea, accompany its use rather frequently; stomatitis, proctitis and dermatitis also may develop in patients receiving the drug.

As with other antibiotics, organisms resistant to aureomycin may emerge; the gram-negative rod *Proteus vulgaris,* which frequently infects the urinary tract, is prone to develop resistance. In some patients serious staphylococcal infection, particularly dysentery, has been encountered when aureomycin was being given for other infections.[6] The advisability of using aureomycin in combination with other antibiotics is in general seriously questioned, although in brucellosis the combined use of aureomycin and streptomycin may well be the treatment of choice.[14]

Chloramphenicol (Chloromycetin) • The first of the "wide-spectrum" anti-

11. Schatz, A.; Bugie, E. and Waksman, S. A. Streptomycin, a substance exhibiting antibiotic activity against gram-positive and gram-negative bacteria. Proc. Soc. Exper. Biol. & Med. 55:66 (Jan.) 1944.

12. Farrington, R. F., and others. Streptomycin toxicity; reactions to highly purified drugs on long-continued administration to human subjects. J.A.M.A. 134:679 (June 21) 1947.

13. Duggar, B. M. Aureomycin: a product of the continuing search for new antibiotics. Ann. New York Acad. Sc. 51:177, 1948.

14. Herrell, W. E., and Barker, T. E. A new method of treatment of brucellosis. J.A.M.A. 144:519 (Oct. 14) 1950.

biotics reported, chloramphenicol, was isolated from *Streptomyces venezuelae* in 1947[15] and subsequently was synthesized in the laboratory. It is moderately effective against some gram-positive and gram-negative organisms and is particularly active against the salmonella and shigella groups. Chloramphenicol is the drug of choice in the treatment of typhoid fever.[16] It exhibits also marked potency against the rickettsiae and several large viruses.

Chloramphenicol is given by mouth; its use has been accompanied by gastrointestinal disturbances, especially diarrhea, in some patients. By far its most alarming toxic manifestation has been bone marrow aplasia. A significant number of fatal cases of aplastic anemia associated with its use has been reported recently.[17]

Terramycin • The isolation and purification of terramycin from *Streptomyces rimosus* in 1950 added a third antibiotic of wide-spectrum efficacy.[18] In general, terramycin has an activity comparable to that of aureomycin and thus has similar indications. Because clinical experience with terramycin is more limited than with the older drugs, fewer data are available.

Toxic reactions involving the skin and gastrointestinal tract have been reported with the use of terramycin, which may be associated also with diarrhea during its administration. In addition, as with aureomycin, staphylococcal dysentery has been noted in patients receiving terramycin for systemic infections.[6] Many staphylococci are highly resistant to terramycin.

ANTIBIOTICS IN ORAL DISEASE

The antibiotics have been of great value in the management of oral disease. In the treatment of Vincent's infection penicillin has been effective;[19-21] evidence suggests that aureomycin[22] and terramycin[23] also are beneficial. Likewise in sublingual phlegmon, herpetic stomatitis and other oral affections, aureomycin, terramycin and chloramphenicol have been used successfully.

Of major importance to dentists and physicians is the problem of preventing bacterial endocarditis. It is now widely recognized that patients with rheumatic or congenital heart disease are predisposed to bacterial endocarditis; furthermore, the transient bacteremias which follow dental extraction or major dental manipulations have been incriminated in a high percentage of cases as the causative factor in endocarditis. Although these procedures are by no means the only cause of bacteremia, they obviously do open up a portal of entry for bacteria.

It now seems likely that the use of large amounts of penicillin before and after such dental procedures is of distinct value in preventing endocarditis.[24,25] Although bacteremia may not be prevented, the use of adequate doses of penicillin probably eliminates any bacteria implanted on the endocardium be-

15. Ehrlich, J., and others. Chloromycetin, a new antibiotic from a soil actinomycete. Science 106:417 (Oct. 31) 1947.

16. Knight, Vernon; McDermott, Walsh, and Ruiz Sánchez, F. Aureomycin and chloramphenicol: use in typhus, typhoid, and brucellosis. (Abst.) J. Clin. Investigation 28:1052, 1949.

17. Hargraves, M. M.; Mills, S. D., and Heck, F. J. Aplastic anemia associated with the administration of chloramphenicol. J.A.M.A. 149:1293 (Aug. 2) 1952.

18. Finlay, A. C., and others. Terramycin, a new antibiotic. Science 111,85 (Jan. 27) 1950.

19. Cofield, K. R.; Ferguson, E. W., and Tove, A. E. Topical application of penicillin in the treatment of Vincent's infection. J.A.D.A. 32:529 (May) 1945.

20. Weiner, Leonard. Use of penicillin in clinical dentistry. J.A.D.A. 32:538 (May) 1945.

21. Rosebury, Theodor. Recent developments in fusospirochetal and related infections. J. Periodont. 17: 121 (July) 1946.

22. Cipes, L. R. Aureomycin. Report of clinical use in 90 cases of bacterial infection in the oral cavity. New York D. J. 16:450 (Oct.) 1950.

23. Caldwell, E. R., Jr., and others. The treatment of various infections with terramycin. J. Lab. & Clin. Med. 36:747 (Nov.) 1950.

24. Glaser, R. J., and others. Effect of penicillin on the bacteremia following dental extraction. Am. J. Med. 4:55 (Jan.) 1948.

25. Hirsh, H. L., and others. Effect of prophylactically administered penicillin on incidence of bacteremia following extraction of teeth; results in patients with healed rheumatic and bacterial endocarditis. Arch. Int. Med. 81:868 (June) 1948.

fore a significant lesion is established.[24] In the case of gingival suppuration or multiple extractions even more intensive treatment should be instituted. In general, therapy should be begun 12 to 24 hours prior to extraction and should be continued for 48 hours thereafter. Large amounts (1,000,000 units or more) of repository penicillin should be employed.

ABUSES IN ANTIBIOTIC THERAPY

The most flagrant abuse of antibiotics is their use in the absence of specific indications. Not only is such a practice of no value but even more important it may be harmful because of the possibility of toxic reactions and the chance that resistant organisms may emerge. As valuable as the antibiotics are now, it should not be forgotten that prior to their advent many medical and dental patients did well without them. Unless a specific indication exists, chemotherapeutic drugs should not be employed.

When they are used, the correct choice and dose of drug are important. In choosing the proper agent, one cannot overemphasize the importance of bacteriological confirmation of the clinical diagnosis whenever possible. In selecting the drug dose, all pertinent factors must be considered. It should be remembered that local application of antibiotics has distinct limitations in many instances, since many superficial infections involve deep tissues. A systemically administered drug is apt to be more effective in the majority of instances, although particular exceptions to this statement exist in the field of oral medicine.

Finally, it is well to remember that the field of antibiotic therapy is in many respects the most rapidly changing one in medicine and dentistry today. For this reason, it is obvious that those who use antibiotics in the treatment of human disease have a real obligation to keep abreast of the developments in the field. Only then, as indications change, as new antibiotics become available and as new dangers are recognized, can one proceed intelligently and in the best interest of his patients.

Seizure of Thought • I have observed with wonder so many intellectual and literary fashions that I have come at last to rely positively upon one conviction alone. No idea is so antiquated that it was not once modern. No idea is so modern that it will not some day be antiquated. . . . To seize the flying thought before it escapes us is our only touch with reality. *Ellen Glasgow, Address to the Modern Language Association.*

The use of antibiotics in oral surgery

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Antibiotics have two general applications, prophylaxis and treatment of infections. Before using any of the antibiotic drugs for either purpose, there should first be a definite need for its administration. To give penicillin or any other antibiotic agent routinely in exodontics or in minor oral surgery is not warranted. Proper sterilization and care of instruments, good operative technic and surgical judgment have always been requisites in surgery; these requirements have not been altered by drug therapy. An antibiotic is adjunctive to established surgical procedures.

There are numerous reasons for discouraging the indiscriminate use of these drugs. Resistance of microorganisms to drugs is an increasingly serious therapeutic problem. Sensitization to penicillin and other drugs is another problem. Superinfection with bacteria, especially gram-negative rods and yeasts, is being encountered. Masking of serious underlying pathologic conditions may result disastrously because one is lulled into a false sense of security. This false sense of security frequently leads to a postponement of necessary surgery (extraction of teeth, establishment of drainage, sequestrectomy) or delay in diagnosis of tumors —results are seen in a referral practice. Reports of more serious complications have appeared in the literature recently and should cause one to consider the possibility that antibiotics may not be completely benign in their action. Wilson and others[1] report two cases of aplastic anemia, one of them fatal, occurring in the course of prolonged chloramphenicol (Chloromycetin) administration. They review six other cases of bone marrow depression associated with the administration of this drug. One of these cases also resulted in death due to aplastic anemia. One other fatal case of a similar nature is reported by Loyd.[2]

These reactions, side effects and complications which have been observed in the administration of antimicrobic agents should induce a more judicious prescribing of these drugs.

PROPHYLACTIC USE OF ANTIMICROBIC AGENTS IN ORAL SURGERY

The majority of dental infections are due to staphylococci, pneumococci, various streptococci, and spirochetes. Ordinarily, penicillin is the drug of choice, while aureomycin, with its wider spectrum of antimicrobic activity, is an effective agent to be used only if penicillin cannot be used. Aureomycin is more effective against deep or generalized infections due to staphylococci.

Presented before the Combined Section Meeting, ninety-third annual session of the American Dental Association, St. Louis, September 10, 1952.

Colonel, Dental Corps; chief, oral surgery section, dental service, Walter Reed Army Hospital, Walter Reed Army Medical Center.

1. Wilson, L. E., and others. Aplastic anemia following prolonged administration of chloramphenicol: a report of two cases, one a fatality. J.A.M.A. 149:231 (May 17) 1952.

2. Loyd, E. L. Aplastic anemia due to chloramphenicol. Antibiotics & Chemother. 2:1 (Jan.) 1952.

For routine prophylaxis it is desirable to begin penicillin one day prior to surgery, giving 300,000 to 600,000 units of procaine penicillin intramuscularly every day for four days or longer if necessary. The absorption rate of this type of penicillin is slow. A therapeutic blood level is reached within two hours, is maintained for 12 hours in all patients and for 24 hours in 80 per cent of patients. If a rapid, immediate high blood level is desired, crystalline penicillin G can be given with therapeutic efficiency occurring in 15 minutes. Since approximately 70 per cent of this effectiveness is lost each hour, the administration of both types of the drug is necessary if adequate blood levels are to be maintained. This combined usage is recommended when an emergency situation arises and surgery in the presence of infection is necessary or when prophylaxis is indicated for other reasons.

Where extensive injuries preclude routine methods of administration and serious infection threatens, a useful combination of drugs which includes 1,000,000 units of crystalline penicillin, 1 Gm. of streptomycin and 2½ Gm. of sodium sulfadiazine in 1,000 cc. of 5 per cent glucose in distilled water may be given over a 12 hour period by slow intravenous infusion. This is repeated for a day or two until the drugs can be given by routine methods. This combination of drugs, in solution for intravenous use, was developed and standardized by Pulaski, Connell and Seeley.[3]

Aureomycin is given in 250 to 500 mg. doses every six hours and should be taken with milk or buttermilk to prevent nausea. A special form of the drug can be given by slow intravenous infusion over 24 hour periods, if the patient's condition precludes oral administration. Its use in this manner offers a distinct advantage in maxillofacial surgery. After the first day or two, if the patient cannot take the drug orally, it can be administered by means of a Levin tube provided that tube feeding has been started by this time. Terramycin has a wide range of antibacterial activity, including checking of organisms commonly found in dental infections. It may be used in place of penicillin and aureomycin. Chloramphenicol has been considered an extremely nontoxic substance; however, in view of recent reports, its use is temporarily restricted to instances where no other antibiotic can be used. Evidence regarding the ill effects associated with its use is not sufficient to condemn this drug which has been of great benefit to thousands of patients.

Although there is no necessity for antibiotic prophylaxis in routine extraction of teeth, potential or actual infectious complications in minor oral surgery warrant such protection. Removal of roots fractured during extraction may be traumatic, and the operating time may be prolonged. Postextraction infection and protracted treatment of tooth sockets may be reduced and the incidence of osteomyelitis materially decreased by judicious use of antibiotics prophylactically.

In traumatic jaw injuries, use of these drugs on a prophylactic basis has materially lowered the incidence of osteomyelitis in compound fractures. As a result, other complications, such as nonunion, are less frequently encountered. Establishment of through drainage in fracture cases now, in contrast to prepenicillin days, is seldom indicated. Compared with men suffering jaw wounds in World War II, the men returning from Korea with similar wounds show a remarkable improvement in general physical condition. Although early adequate antibiotic prophylaxis merits much credit, prompt evacuation and early skillful professional care must be recognized as important fac-

3. Pulaski, E. J.; Connell, J. F., Jr., and Seeley, S. F. Sterilization of the intestinal tract by antibiotics and supplemental agents. Ann. Surg. 132:225 (Aug.) 1950.

tors contributing to the excellent condition of these men injured in war. Secondary osteomyelitis in war casualties is rarely seen today, and fewer cases require bone grafting. Prevention of impending infection affords salvage of much tissue which formerly might have been sacrificed. On proper indications, bone grafts may be done much earlier with fewer postoperative complications and a shortened period of hospitalization.

It is well to mention the place which sulfadiazine retains in the management of maxillofacial injuries. It is of particular value in prophylaxis in cases of meningococcic meningitis in which fractures of the maxilla are complicated by craniocerebral injury. Injuries sustained in automobile and airplane accidents frequently involve the middle portion of the face and are almost as frequently complicated by basilar skull fractures. In addition to penicillin, sulfadiazine should be given in all cases where there is cerebrospinal rhinorrhea or otorrhea. Penicillin in high dosages (1,000,000 units every two hours) produces an adequate level in the cerebrospinal fluid in the treatment of meningococcic meningitis.

It should be remembered that if sulfa drugs are used it is necessary to keep the urine alkaline during therapy. This is done by giving 2 or 3 Gm. of sodium bicarbonate with each dose of the drug. Obstructive renal toxicity, as a complication, is thus avoided. Sulfisoxizole (Gantrisin) is apparently as effective as sulfadiazine and has an advantage in the fact that alkaline drugs need not be administered concomitantly. It is recommended also for prophylactic use following tooth extraction; since it does not produce renal blocking, it is safer for use with outpatients than other sulfa drugs.

Certainly, there is indication for antibiotic prophylaxis when there is accidental perforation of the maxillary sinus. Many patients have been spared lifelong sinus disease by prompt administration of penicillin after this type of an accident. Streptomycin is effective against acid-fast bacilli and gram-negative rods, organisms prevalent in the respiratory tract. These drugs, penicillin and streptomycin, are synergistic; and their combined usage is desirable in cases of mixed infections. A commonly employed mixture consists of procaine penicillin 300,000 units, aqueous penicillin 1,000,000 units and streptomycin 1 Gm. administered intramuscularly.

Displacement of mandibular third molar root tips through the lingual cortical plate establishes an open avenue for the spread of infection to the spaces of the neck. Displacement of a maxillary third molar or portion of that tooth through the posterior wall of the maxilla into the infratemporal space may initiate a widespread infection ascending to the brain. The incidence and severity of these complications are materially lessened by prompt antibiotic prophylaxis.

Patients with certain systemic diseases and illnesses should be protected from bacteremia when teeth are extracted. Antibiotic prophylaxis is indicated for all patients with a history of rheumatic fever or for those with a systolic murmur. Rheumatic heart disease is a fairly common ailment; and patients with valvular damage are prone to develop subacute bacterial endocarditis, which, prior to the advent of antibiotics, was fatal in a high percentage of cases.

It is well to protect patients when extraction of teeth is necessary in the presence of acute infection. Krogh[4] has shown that it is better to extract teeth immediately than to wait for the acute phase to subside. It is also good insurance to administer antibiotics prophylactically when indicated.

There is probably no harm in placing commercially available sulfonamide or antibiotic cones in tooth sockets for prophylaxis against infection. There are many favorable reports on this procedure.

4. Krogh, H. W. Extraction of teeth in the presence of acute infections. J. Oral Surg. 9:136 (April) 1951.

THERAPEUTIC USE OF ANTIMICROBIC AGENTS IN ORAL SURGERY

Today it is a common practice in the professions to treat swellings of all types with penicillin or one of the other antibiotics. This is a poor practice, since treatment of any swelling should be based on diagnosis. Recently Daniel J. Holland of Boston, speaking on this subject, classified swellings into four general groups: inflammatory, traumatic, neoplastic and congenital (or developmental). Obviously, antibiotic therapy is effective in inflammatory swellings in which bacteria are the etiologic factor. There may be superimposed infection in traumatic and neoplastic swellings which justifies the use of antibiotics, but underlying malignancies which may lead to serious consequences must not be overlooked. Therefore, it is the practitioner's responsibility first to establish an accurate diagnosis and then to treat the disease. This is a fundamental rule which is equally as important today as it was prior to the advent of antibiotics. A brief history of constitutional symptoms (fever, chills, sweats and pain), of the duration of complaints and of the course of the illness aids in establishing a clinical diagnosis of infection. Repeated clinical and roentgenographic examinations are essential. Since diseased teeth are the cause of the vast majority of swellings in adjacent tissues, a careful search for such an etiological factor is indicated. Laboratory examination constitutes the final step in diagnosis. Hematological studies and histopathological examination of tissues may be indicated to differentiate between inflammation and tumor.

Cultures are valuable in diagnosis of infection, but their real value lies in differential diagnosis. Just as indiscriminate treatment of all swellings with antibiotics is condemned, so is the empirical use of antibiotics in treatment of inflammatory swelling considered an equally poor practice.

The number of antibiotics which are effective against infections in and adjacent to the oral cavity offers several possibilities in therapy. The ideal selection of the most effective drug is made on the basis of culture-sensitivity tests. Should allergy or other side effects contraindicate use of the drug of choice, results of such tests should provide indications for the use of alternate drugs. As stated previously, antibiotic-resistant organisms, specifically staphylococcus and nonhemolytic streptococcus, are progressively increasing, so that where penicillin may once have been effective it may no longer be so. A rapid method for testing the antibiotic sensitivity of organisms has become a practical guide to therapy. A simple paper disk technic provides rapid testing of the infectious material; in most instances, reports are available within one day.[5] This bacteriological examination has repeatedly proved to be of immense value. Infections which fail to respond to one antibiotic, when cultured, reveal resistant organisms which are sensitive to another drug. This knowledge is obtained in 24 hours; soon after the therapy is changed, the case is brought under control without difficulty.

SUMMARY

After 10 to 15 years of antimicrobic therapy, the new drugs have in no way modified sound surgical principles. Indiscriminate antibiotic therapy is unwarranted and may even be hazardous, especially if it delays a full and accurate diagnosis of a pathologic condition.

Proper antibiotic therapy shortens the course of infection and decreases mortality and disabling chronic disease. Laboratory service is a valuable aid in determining the selection of the most effective agent against an infection.

5. Fusillo, M. H., and Kuhns, D. M. A rapid paper disk antibiotic sensitivity technic. Med. Tech. Bull. 3:7 (Jan.-Feb.) 1952.

The use of antibiotics in periodontics and endodontics

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Although there is no doubt that antibiotics have a place in the fields of both endodontics and periodontics, the introduction of this drug group has brought forth greater enthusiasm and more extensive use than the facts justify. Such enthusiasm frequently greets new drug groups when they are first introduced. Within the past decade, for example, a tremendous initial enthusiasm for topical application of the sulfonamides was followed by a rapid decline in their use until today nearly everyone who has studied the problem agrees that there is little value and numerous dangers connected with their use. The Council on Pharmacy and Chemistry of the American Medical Association in *New and Nonofficial Remedies* states flatly: "The use of sulfonamides as topical applications in wounds, burns and in superficial infections is . . . contraindicated."[1] Similarly when the first of the antibiotics became plentiful at the close of World War II, they were extremely popular for topical application, particularly in the treatment of acute necrotizing gingivitis (Vincent's). Penicillin was the first and most extensively used of the antibiotics for this purpose; and while it has some usefulness, a more rational and conservative attitude toward its use has developed. There are several sound reasons for a conservative tendency in the use of penicillin and other antibiotics for the treatment of periodontal disease. First, oral reactions to the topical application of penicillin and other antibiotics have been noted fairly frequently. While not serious in the sense of being dangerous to life, these reactions can be painful and most unpleasant.[2,3] Second, there are increasing reports of patients being sensitized to penicillin. While it is difficult to determine the exact percentage of persons who react to the use of penicillin, some recent estimates have run as high as 8 to 10 per cent.[4] Furthermore, it is known that the epithelial structures are more readily sensitized than deeper structures; in *New and Nonofficial Remedies*, 1951, it is stated: "Topical application of penicillin is most likely to produce sensitization and it should not be used in this way."[5] Furthermore, sensitization reactions to other

Presented before the Combined Section Meeting, ninety-third annual session of the American Dental Association, St. Louis, September 10, 1952.

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1. Council on Pharmacy and Chemistry, American Medical Association. New and nonofficial remedies. Philadelphia, J. B. Lippincott Co., 1951, p. 94.

2. Phillips, E. Glossitis and stomatitis due to penicillin lozenges and troches. Permanente Found. M. Bull. 4:20 (Feb.) 1946.

3. Burket, Lester W. Oral medicine; diagnosis and treatment. J. B. Lippincott Co., 1952, p. 92-94.

4. Lepper, M. H., and others. Symposium on antibiotics; studies on hypersensitivity to penicillin; incidence of reaction in 1303 patients. J. Clin. Investigation 28:826 (Sept., pt. 1) 1949.

5. Council on Pharmacy and Chemistry, American Medical Association. New and nonofficial remedies. Philadelphia, J. B. Lippincott Co., 1951, p. 120.

antibiotics are known to occur[6,7] although they have not as yet been used extensively enough to determine whether the incidence of such reactions is increasing as it has with penicillin now that a large part of the population has been treated with the antibiotic.

A third factor which indicates conservatism in the treatment of periodontal disease by topical application of the antibiotics is the possibility of the development of resistant strains of organisms. In recent years there has been a decided increase in the incidence of penicillin-resistant strains of staphylococci. Some authorities are of the opinion that penicillin is no longer the drug of choice for the treatment of staphylococcic infections.[5] In an investigation conducted at Walpole, Massachusetts, by representatives of the Federal Food and Drug Administration, a greater percentage of mouth organisms was found to be resistant to penicillin after the use of a penicillin dentifrice.[8] A similar study conducted by Hill and associates at South Euclid, Ohio, produced similar findings.[9] Streptomycin tends to produce resistant strains of bacteria very readily.[10] Some of the newer antibiotics appear to produce resistant strains with difficulty, but it can occur.[11]

In short, three tendencies have developed in topical antibiotic therapy: (1) possible localized reactions to the antibiotic in the mouth, (2) possible sensitization of the patient to the antibiotic concerned and (3) possible production of resistant strains of organisms. Therefore, it seems clear that a conservative approach is justified. The evaluating committee on the treatment of periodontal disease at the Michigan Workshop held in Ann Arbor in September, 1951, reported:[12]

> Antibacterial drugs can be used to advantage in combatting acute infectious phases of some types of periodontal diseases. Antibiotics, particularly penicillin, aureomycin, and perhaps chloromycetin and terramycin, have been found to be effective in treating the acute phase of periodontal infection. Unfortunately, the possibility exists of sensitization of the patient to those agents and the development of refractory, bacterial strains if inadequate dosage is used. This outcome is particularly frequent when therapy by lozenges or troches is employed.

To summarize, there seems to be acceptable evidence that the acute phase of Vincent's stomatitis and possibly some other types of infectious stomatitis may respond to topical antibiotic therapy. It should be emphasized, however, that this response does not constitute a cure and that the usual procedures for restoring good mouth hygiene must be carried out. In addition, because of the hazards which are always present, the topical use of the antibiotics should be restricted to those instances where the infection is severe and where other methods of treatment are not deemed adequate. Undoubtedly, certain severe cases of Vincent's angina with extensive throat involvement should be treated systemically with penicillin or possibly with terramycin if the patient is penicillin-sensitive.

Penicillin is useless for herpetic lesions of the oral region as it is for all other virus infections; but several reports indicate that the use of aureomycin systemically shortens the recovery time for acute infectious gingivostomatitis (herpetic stomatitis) and reduces the fre-

6. Peck, S. M., and Feldman, F. F. Sensitivity reactions to aureomycin. J.A.M.A. 142:1137 (April 15) 1950.

7. Cipes, L. R. Aureomycin. Report of clinical use in 90 cases of bacterial infection in the oral cavity. New York D. J. 16:450 (Oct.) 1950.

8. Welch, H., and others. The effect of prolonged use of penicillin tooth powder on the penicillin resistance of oral microorganisms. Antibiotics & Chemother. 2:249 (May) 1952.

9. Hill, Thomas J.; Sims, John, and Newman, Millicent. The effect of penicillin dentifrice on the control of dental caries and the production of resistant organisms. (Abst.) J. D. Res. 31:461 (Aug.) 1952.

10. Bryson, V., and Demerec, M. Patterns of resistance to antimicrobial agents. Ann. New York Acad. Sc. 53:283 (Sept. 15) 1950.

11. Gocke, T. M., and others. In vitro studies on terramycin. Ann. New York Acad. Sc. 53:297 (Sept. 15) 1950.

12. Michigan, University of, School of Public Health. Evaluating committee reports of the workshop for the appraisal of scientific information concerning periodontal disease, September 10 through 15, 1951. Ann Arbor, Mich., University of Michigan Press, 1952.

quency of recurrence.[13,14] There is also some evidence,[13] though of a much less convincing type, that topical applications of an aureomycin ointment have a favorable therapeutic effect on the discrete lesions of herpes simplex (common cold sores). Since chloramphenicol (Chloromycetin) and terramycin closely resemble aureomycin and are known to be effective against certain virus infections,[15] they have been used also for treatment of herpetic lesions but with even less supporting evidence than is available for aureomycin. Recently, cases of aplastic anemia have been reported following systemic administration of chloramphenicol.[16] Because of this hazard and the fact that aureomycin and terramycin undoubtedly serve equally well for all dental purposes, chloramphenicol should not be prescribed for systemic use in dentistry at the present time.

Tyrothricin and bacitracin troches are available for treatment of oral infections and have been widely advertised for treatment of Vincent's infection; however, the evidence in support of such use is limited. In one study at the University of Michigan, School of Dentistry, results in the treatment of Vincent's infection with tyrothricin troches were definitely unsatisfactory.[17] The fact that tyrothricin is inhibited to some degree by the presence of saliva may account for the poor results noted.[18]

ANTIBIOTICS IN ENDODONTICS

In the field of endodontics there can be no doubt that the antibiotics have an important place in the treatment of severe periapical infections by the systemic route. In a case of periapical swelling, fever and malaise, penicillin should be administered by either the intramuscular or the oral route; 300,000 units of procaine penicillin G may be deposited in the gluteal or deltoid muscle, or 100,000 units to 200,000 units of penicillin may be administered by the oral route every three hours. Recently there has been some tendency to administer 200,000 to 400,000 units orally every six to eight hours with apparent success. If the penicillin is given orally, it should be administered at least one-half hour before eating or not sooner than 1½ hours after eating to avoid inactivation by the acid of the stomach.

The most extensive use of the antibiotics in endodontics has been topical application within the pulp chamber. Penicillin was first widely used for this purpose but was found inadequate by itself because of the frequent presence of penicillin-resistant organisms.[19,20] A combination of penicillin and streptomycin has been found to be much more satisfactory than penicillin alone; but this combination, while it frequently eliminates all bacteria, may leave a residual growth of yeasts. This same finding has been observed by other investigators. Grossman introduced a polyantibiotic mixture containing a fungicide to overcome this difficulty.[21] This preparation is a paste which contains penicillin, bacitracin, streptomycin and sodium caprylate in a silicone vehicle. Although this has been one of the most effective of the antibiotics or antibiotic combinations

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15. Council on Pharmacy and Chemistry, American Medical Association. New and nonofficial remedies. Philadelphia, J. B. Lippincott Co., 1951, p. 117-136.

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17. Ingle, J. I. Clinical evaluation of tyrothricin used in the treatment of necrotizing ulcerative gingivitis. Washington D. J. 18:7 (March) 1950.

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19. Crowley, Mary C., and Harner, Verna. Penicillin sensitivity of streptococci isolated from root canal infections and the normal mouth. J. D. Res. 26:399 (Dec.) 1947.

20. Seltzer, Samuel, and Bender, I. B. The use of chloramphenicol (Chloromycetin) for killing some penicillin-streptomycin resistant organisms encountered in infected root canals. J. D. Res. 29:825 (Dec.) 1950.

21. Grossman, L. I. Polyantibiotic treatment of pulpless teeth. J.A.D.A. 43:265 (Sept.) 1951.

suggested for use in endodontics, no antibiotic preparation has been adopted for routine use in the clinic at the University of Michigan, not, however, on account of any arbitrary objection to antibiotics *per se*. The dangers of topical antibiotic therapy in endodontics are far fewer than those connected with the use of antibiotics in periodontics, since in endodontics the drugs are used within a closed chamber and do not come in contact with epithelial structures. Therefore, there is less chance of sensitizing the patient to the antibiotic or antibiotics used although reactions have occurred in patients known to be sensitized to penicillin. Furthermore, there is less chance of producing antibiotic-resistant organisms since instead of all the organisms in the oral cavity being exposed to the antibiotic as in periodontal treatments only those organisms present in the root canal and periapical area are exposed.

At the University of Michigan even when the polyantibiotic paste preparation was used, results were not much better than those obtained with the drugs used previously. Furthermore, the results reported by Grossman and other investigators using antibiotics[21, 22] have been quite similar to those obtained at the University of Michigan Clinic with commonly used drugs. In short, we have not been able to demonstrate any great time-saving element in our hands for the topical use of antibiotics in the treatment of root canal and periapical infections.

Another disadvantage in the use of antibiotics for root canal treatments is the difficulty of obtaining accurate cultures. Buchbinder and Bartels[23] as well as many other investigators have clearly shown the necessity for inhibition of antibiotics used in root canals when cultures are taken. Penicillinase media may be used when penicillin is the antibiotic sealed into the tooth, but this type of medium is quite unstable. Recent directions by the manufacturer for the preparation of penicillinase media state:[24]

> A number of tubes of penicillinase medium mixture may be prepared at one time and stored at 5° C. to 10° C. for periods up to one week. Longer storage is not recommended because of the gradual deterioration of penicillinase solutions even at refrigerator temperatures.

Media for the inactivation of streptomycin may be prepared by the addition of hydroxylamine hydrochloride; but as far as the author knows, there are no commercially prepared media of this type nor are there any suitable inhibitors for the other antibiotics for incorporation into culture media. It becomes difficult if not impossible, therefore, for the average practitioner to maintain a supply of suitable culture media which will assure accurate cultures when the antibiotics are used for root canal treatments. Since cultures are essential for routinely successful results in endodontics, the routine use of antibiotics in root canal treatments is not recommended.

Another, though less difficult, problem to surmount in the use of antibiotics in root canal therapy is the obtaining and maintaining of suitable antibiotic preparations for introduction into the root canals.

Because of these numerous problems not yet solved, at the present time antibiotic therapy is not suitable for routine use in endodontics; however, the antibiotics are being used experimentally, and in selected cases in practice their use may be indicated. It is entirely possible that someone may find a suitable antibiotic or antibiotic mixture, plus a suitable culture medium to use with it, which will give results far superior to those possible with drugs now available to the profession.

22. Ostrander, F. D., and Crowley, M. C. The effectiveness of clinical treatment of pulp-involved teeth as determined by bacteriological methods. J. Endodontia 3:6 (Jan.) 1948.

23. Buchbinder, Maurice, and Bartels, H. A., Criticism of the use of root canal cultures in evaluating antibiotic therapy. Oral Surg., Oral Med. & Oral Path. 4:886 (July) 1951.

24. Schenley Laboratories' package insert for Penicillinase.

THE PENICILLIN DENTIFRICE

In 1948 Hill and Kniesner reported on a study of the effectiveness of a penicillin dentifrice on dental caries in children.[25] It had been known for some years that penicillin was capable of suppressing the growth of *Lactobacillus acidophilus* and therefore it was thought possible that the routine use of a dentifrice containing penicillin might cause a significant reduction in dental caries. The negative results obtained in this first study might have been due to failure of the subjects to brush their teeth routinely since the study was unregimented.

In 1950 Zander reported a carefully regimented study involving a group of 202 children who for two years had used a tooth powder containing 500 units of penicillin per gram.[26] Zander reported a reduction of approximately 54 per cent in dental caries incidence among these children as compared to a control group. In a limited study conducted in New Zealand, Walsh and Smart were unable to demonstrate any beneficial effect from a dentifrice containing 100 units of calcium penicillin per gram.[27] In a further attempt to clarify the possible values of a penicillin dentifrice, Hill and associates conducted a regimented experiment on 492 school children for one year in the South Euclid, Ohio, public schools.[9] The results showed a reduction of approximately 10 per cent in the number of new carious teeth and a reduction of 16 per cent in the number of new carious surfaces for the experimental group. Nearly everyone who has followed dental caries research closely agrees that in a disease so nearly universal as dental caries, these reductions are not greatly significant. For all practical purposes, it can be said that three out of the four studies reported to date on the use of a penicillin dentifrice for control of dental caries have given negative results and its value must be regarded as unproved.

Whenever a penicillin dentifrice is used, there are always two potential undesirable side effects: (1) the production of penicillin sensitivity and possible sensitivity reactions in patients and (2) the development of penicillin-resistant organisms. Although there has been no evidence of frequent sensitization or sensitization reactions to date, sensitization always remains a potential hazard of the penicillin dentifrice. In the matter of the possible production of penicillin-resistant organisms, two separate studies indicate that users of a penicillin dentifrice show a higher percentage of mouth organisms resistant to penicillin than do nonusers of penicillin dentifrices. How significant this finding may be is not clear at this time; however, the Ad Hoc Committee on Penicillin Dentifrices of the National Research Council cautions that its possible importance must be considered carefully.

Because of the equivocal evidence in support of the efficiency of penicillin dentifrices and because of the possible side effects, the Council on Dental Therapeutics in a recently prepared report concluded in part as follows: "On the basis of available evidence, penicillin dentifrices should not be distributed at the present time, except on a prescription basis." Fortunately, Food and Drug Administration regulations continue to require that they be dispensed only on prescription.

While there may be justification for the use of penicillin dentifrices on the prescription basis in cases of rampant caries which does not respond to other forms of control, presently available data do not justify their widespread use at this time. Certainly further careful re-

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26. Zander, H. A. Effect of a penicillin dentifrice on caries incidence in school children. J.A.D.A. 40: 569 (May) 1950.

27. Walsh, J. P., and Smart, R. S. Clinical trial of a penicillin tooth powder. New Zealand D. J. 47:118 (July) 1951.

search is required before their exact values and limitations can be clarified.

SUMMARY

One of the most unfortunate aspects of the introduction of antibiotics into periodontics and endodontics is a tendency on the part of some dentists to lose sight of certain fundamentals in successful therapy. In periodontics there has been a tendency toward the treatment of Vincent's infection with antibiotics alone without careful restoration of good mouth hygiene. In endodontics there has been some tendency to overlook the importance of an adequate root canal filling when antibiotics are used. Such omissions are bound to result in failure. Rationally and conservatively used, the antibiotics offer a valuable addition to the armamentarium of both the periodontist and the endodontist; but they must not be considered a substitute for other well established requirements for successful therapy in these fields.

Chloramphenicol and terramycin in the treatment of recurrent aphthous stomatitis

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Previous investigations into the etiology and treatment of recurrent aphthous stomatitis have been characterized by negative findings and failure. A viral etiology has been suggested[1-5] but in the past most investigators have not been able to isolate a virus from recurrent aphthous lesions.[7,8]

Recurrent oral aphthae are infrequently observed at their inception, at which time they are generally seen as vesicles. Usually they are noted as frequently recurring ulcers, commonly from 1 to 12 mm. in size, but occasionally 2 or 3 cm. in size, appearing anywhere in the oral cavity, highly sensitive and painful, often covered by necrotic membranes or exudates, and usually surrounded by an area of inflammation. The ulcers frequently are round or oval but they may present irregular peripheries. Single or multiple lesions may recur periodically for years. In most instances the ulcers heal in 10 to 14 days, but are followed by new lesions or crops of lesions after a period of remission which varies with the individual.

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1. Cahn, L., Virus disease of the mouth. Oral Surg., Oral Med. & Oral Path. 3:1172 (Sept.) 1950.

2. Robinson, H. B. G., Recurrent lesions of oral mucosa. Postgrad. Med. 8:248 (Sept.) 1950.

3. Queries and minor notes. J.A.M.A. 141:362 (Oct. 1) 1949.

METHODS

Chloramphenicol (Chloromycetin)[9] was administered to 13 patients with recurrent oral aphthae on a dosage regimen of 500 mg. perorally every six hours—a total of 2 Gm. a day—the first, second, fifth, sixth, ninth and tenth days. Identical placebo control capsules (containing an inert substance in place of the active ingredient chloramphenicol) were administered similarly during control therapy cycles. Thirteen patients were treated with systemic terramycin hydrochloride and placebo control capsules[10] (containing an inert substance in place of the active ingredient terramycin hydrochloride) according to an identical dosage schedule. The patients were examined two or three times weekly through a minimum of four cycles or recurrences. In treating five patients with chloramphenicol, medication was administered during one cycle for six consecutive days immediately after the onset of lesions. Five patients were similarly treated with terramycin. In five patients, chloramphenicol medication was administered for three days just prior to the expected onset of new lesions (as suggested from the regular periodicity of recurrence described in the case history and from observation during control cycles). Five patients were similarly treated with terramycin. The average total dose of chloramphenicol per patient was 27 Gm. and of terramycin 23 Gm.

RESULTS

During the period of treatment with chloramphenicol or terramycin, the size and severity of the aphthae present at that time and the attendant discomfort (as described by the patients) were somewhat decreased. It appeared that the duration of the lesions was slightly shortened. These observations could not be interpreted as a cure since neither chloramphenicol nor terramycin therapy prevented the subsequent return of lesions. Aphthae frequently appeared even during periods of active therapy. Medication did not increase the length of the remission or free periods in the cycle. In subsequently recurring attacks of this disease, the number, severity, and duration of the new lesions appearing after the conclusion of the courses of placebo, chloramphenicol and terramycin therapy were approximately the same as prior to medication.

In general, both therapeutic agents were well tolerated. During the course of therapy with chloramphenicol, reactions were observed in a total of two patients. These included rash in one instance, slight indigestion in two, unpleasant taste in two and mild insomnia in one. During the course of therapy with terramycin, reactions were observed in a total of two patients. These included slight nausea in two instances; slight diarrhea in two; and pruritus ani in one. The rash in one patient treated with chloramphenicol appeared on the last day of scheduled therapy. It was not necessary to discontinue therapy for any patient because of these side actions.

4. Queries and minor notes. J.A.M.A. 141:299 (Sept. 24) 1949.

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6. Kilbourne, E. D., and Horsfall, F. L., Jr. Primary herpes simplex virus infection of the adult. With a note on the relation of herpes simplex virus to recurrent aphthous stomatitis. Arch. Int. Med. 88:495 (Oct.) 1951.

7. Blank, H., and others. Recurrent aphthous ulcers. J.A.M.A. 142:125 (Jan. 14) 1950.

8. Dodd, K. M., and Ruchman, I. Herpes simplex virus not the etiologic agent of recurrent stomatitis. Pediatrics 5:883 (May) 1950.

9. Chloramphenicol and identical placebo capsules were supplied by Parke, Davis and Co.

10. Terramycin hydrochloride and identical placebo capsules were supplied by Charles Pfizer and Co.

Healing of extraction wounds after introduction of hemostatics and antibiotics

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When dentists use antibiotics and hemostatics locally after extractions, they want to know first: Does this procedure aid in the healing of the wound?, and second: How do these drugs react in the healing process?

This paper will describe a study undertaken to show the microscopic changes that take place in the healing of extraction wounds after hemostatics and antibiotic substances have been introduced into the socket. The histologic study of the healing of extraction wounds has been reported by Euler,[1] Claflin,[2] Bauer,[3] Mangos,[4] Hubbell and Austin,[5] and many others. The results of all these investigators were fairly constant. Histologic study also has been made of the healing of extraction wounds after introduction of chemical substances but there has been no further examination of the action of antibiotics and hemostatics on extraction wounds. Since these agents are used extensively, there is a need for such information.

PREVIOUS STUDIES

Euler[1] was the first to report on a systematic histologic examination of the healing process of extraction wounds. His work was done on dogs and his findings were later supplemented by other investigators through experiments on sheep, hamsters, and, to a limited degree, on human beings. It was shown by Christopher[6] in his study of the healing of extraction wounds in human beings that extraction wounds in dogs healed twice as fast as those in men. Christopher's patient died of leukemia, thus some error may have been present. Euler, however, microscopically examined a 15 week old extraction in a man and found that the progress of the tissue changes was comparable to that in an eight week old extraction wound in a dog. Mangos[4] pointed out that man's healing differs from dogs' in that it takes twice as long in man for the epithelium to heal, and three times as long for the bone to heal. Histologically there were no differences in the healing process. Thus it can be seen that time is the only factor that differs in the healing of extraction wounds in man and the dog.

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2. Claflin, R. S. Healing of disturbed and undisturbed extraction wounds. J.A.D.A. 23:945 (June) 1936.

3. Bauer, W. H. The importance of the histological picture of osteomyelitis of the jaw following the extraction of teeth. Am. J. Orthodont. & Oral Surg. 26:150 (Feb.) 1940.

4. Mangos, J. F. Healing of extraction wounds. New Zealand D. J. 37:4 (Jan.) 1941.

5. Hubbell, A. O., and Austin, L. T. Extraction wounds and therapeutic agents; an experimental study. J.A.D.A. 28:251 (Feb.) 1941.

6. Christopher, R. F. Histological study of healing in relation to the extraction of teeth. (Abst.) Northwest. Univ. Bul. 43:5 (Dec. 7) 1942.

CLINICAL PROCEDURE

In the present study the teeth of four dogs were extracted at definite intervals, and certain drugs were inserted into the sockets. The dogs were then sacrificed and the sections were prepared for microscopic study.

Four healthy mongrels were used. They were fed a well balanced dog chow prepared by Purina. The extractions were limited to the mandibular teeth in order to facilitate the healing process and the sectioning of the specimens.

The teeth were extracted in order so as to show the healing of the extraction wound at the second, fourth, ninth, eleventh, sixteenth, twenty-second, and thirty-second days. The plan for the extraction of definite teeth had to be abandoned because some of the selected teeth were fractured during the extractions, thus necessitating the use of other teeth. The teeth used were the mandibular right and left first, second, third and fourth premolars as well as the second and third molars. The method of extraction consisted of freeing the gingival tissue from around the neck of the tooth and then extracting the tooth itself by simple rotation. A 2 per cent intravenous thiopental sodium was used as the anesthetic at each extraction.

Immediately after the extraction, a penicillin cone was placed in the socket of one dog; a sulfanilamide-sulfathiazole cone was introduced in the socket of the second dog; in the socket of the third dog an oxidized-cellulose was used, while the socket of the fourth dog was left untouched as a control.

The preparation of the specimens for microscopic study was carried out in the usual manner of decalcification and staining with hematoxylin and eosin.

MICROSCOPIC FINDINGS

The microscopic changes in the healing of extraction wounds in dogs when sulfanilamide-sulfathiazole cones were placed in the sockets after extractions were as follows:

Second Postextraction Day • The socket appeared to be filled with a foreign material (sulfanilamide-sulfathiazole cone) which was interspersed with collections of erythrocytes. This foreign material appeared to be breaking up. The bony wall of the socket was partially covered by the remains of a degenerating periodontal membrane. At the apex of the socket, there were islands of foreign matter intermingled with clumps of erythrocytes. The surface bony wall of the socket, which was not covered by the degenerating periodontal membrane, appeared to be in an aplastic condition. There was no tendency for the adjacent gingival epithelium to proliferate.

Fourth Postextraction Day • The socket was almost entirely filled with a foreign material. There were clumps of red blood cells dispersed throughout the remainder of the socket. Remnants of the periodontal membrane were seen along the socket wall. The formation of a surface blood clot was seen at the alveolar crest of the socket. There was evidence of osteoclastic activity all along the bony wall of the socket.

Ninth Postextraction Day • There were still some particles of the foreign material remaining in the socket. The apical third of the socket showed some organization starting from the lateral walls. The remaining portion of the socket was devoid of any substance. The gingival epithelium did not appear to be changed.

Sixteenth Postextraction Day • The socket was completely devoid of any substance except for a few particles of the afore-mentioned foreign matter. The gingival epithelial tissue showed the beginning of proliferation over the socket. The other structures were the same as

were found in the socket on the ninth postextraction day (Fig. 1, left).

Thirty-second Postextraction Day • The socket appeared to be filled with a well-arranged network of newly-formed bone trabeculae which developed from the lateral walls and the apex. The bone marrow spaces were filled with a loose connective tissue which was fairly vascular. Fat cells also were seen in these marrow spaces. The gingival surface of the socket was filled with a highly vascular young connective tissue, which in turn was partially covered by the proliferating gingival epithelium (Fig. 1, right).

The histologic changes in the healing of extraction wounds after penicillin tablets (50,000 units) were placed in the socket were as follows:

Second Postextraction Day • The outline of the socket showed a slight bone deposition on the resorbed bony wall of the socket. The bony crest of the socket showed definite areas of resorption with no deposition of bone. The apex of the socket was filled by masses of hyalinized tissue on which areas of red blood cells accumulated. There was a uniform mass of erythrocytes covering the gingival third of the socket. There appeared to be epithelial rests on the surface of the blood clot. There were slight traces of a foreign material within the masses of erythrocytes.

Fourth Postextraction Day • At this stage, the blood clot appeared to be undergoing organization via young connective tissue, particularly at the apex and the walls of the socket. The center and gingival third of the socket were still filled by a uniform mass of red blood cells. There was a slight proliferation of the gingival epithelium.

The bony wall of the socket showed resorption at the crest, while along the wall of the socket there was a moderate deposition of bone. There was no foreign material seen at this time.

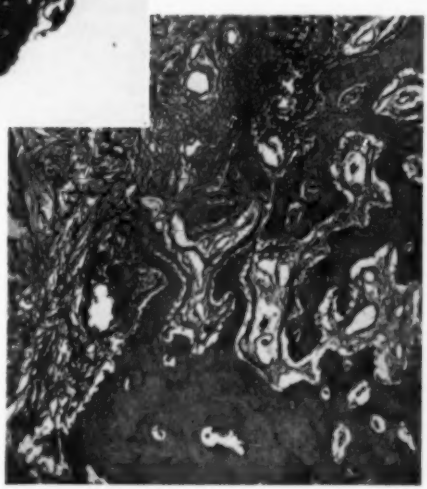
Ninth Postextraction Day • The oral surface of the cavity was lined by epithelial layers which grew over a highly vascular, loose connective tissue. Small islands of the clot were still preserved in the center of the socket. This highly vascular granulation tissue extended beneath the crest of the alveolar socket and merged with the blood clot at the apex. The organization of the clot proceeded also from the apex where newly-formed bone trabeculae were visible. Similar areas of organization and bone formation were observed close to the crest of the socket (Fig. 2, left).

Eleventh Postextraction Day • At this time the organization of the blood clot appeared to be completed. The blood clot was replaced by a partially dense and a partially loose connective tissue. Few bone trabeculae were seen reaching from the apex of the socket into this newly-formed granulation tissue. The surface of the extraction wound appeared to be covered by the proliferation of a narrow gingival epithelium. There was still some osteoclastic resorption of the crest of the socket. Clinically, the socket appeared to be healed at this time.

Sixteenth Postextraction Day • There was no particular change in this 16-day-old extraction wound when compared with the 11-day-old extraction wound, with the exception of a slight progress in healing. There were still a few clusters of erythrocytes in the center of the socket. The young connective tissue was more dense and more bony trabeculae were present at the apex of the socket as well as along the lateral wall of the socket.

Twenty-second Postextraction Day • The whole socket appeared to be filled by a

Fig. 1 • Left: Sixteen day old extraction wound in which sulfanilamide-sulfathiazole has been used. Shrunken foreign material in a socket of which the bony walls are denuded. No healing process visible



Right: Thirty-two day old extraction wound in which sulfanilamide-sulfathiazole has been used. Area at the fundus of the socket shows deposition of bone trabeculae in a highly vascular loose connective tissue

fine network of young bony trabeculae. These trabeculae surrounded marrow spaces which were filled by a loose connective tissue showing few fat cells. The gingival epithelium had proliferated along the more-or-less dense connective tissue. The newly-formed covering of gingival epithelial tissue differed from the neighboring epithelial tissue inasmuch as the former had long fingerlike projections down into this young connective tissue at the surface of the socket. The border between the original outline of the socket and the new bone was fairly visible because of the resorption lines between the two layers of bone. There was no osteoclastic activity visible at this time(Fig. 2, right).

The histologic changes in the healing of extraction wounds in dogs after an oxidized-cellulose was used after extractions, were as follows:

Eleventh Postextraction Day • The gingival third of the socket was filled with a poorly-formed blood clot between aplastic walls of the socket. There were two flaps of the gingiva which collapsed into the oral opening of the socket leaving a canal-like opening between them. An entirely different picture presented itself at the apex socket. Here a well-organized blood clot filled the apical third of the healing socket. There was an extremely moderate bone deposition. Interspaced in this young connective tissue were remains of foreign material. Occasionally, crests of periodontal membrane were seen along the lateral walls of the socket.

Sixteenth Postextraction Day • The socket still contained a foreign material. Cross sections of this foreign material showed separation of these polyhedral bodies from each other by lines which apparently consisted of densely packed erythrocytes with single darkly stained longitudinal cells. The peripheral outline of the socket was covered by newly deposited bone trabeculae with surrounding young connective tissue. The gingival third of the socket was composed of dense connective tissue which in turn was partially covered by the proliferating epithelial tissue (Fig. 3, left).

Twenty-second Postextraction Day • The contents of the socket had undergone a reticular atrophy in the center while a fairly heavy bone desposition proceeded from the lateral walls and the apical third. The layer of bone deposition was lined by a thin layer of loose connective tissue. There was still some evidence of a foreign material in the center of the socket. There was no evidence of gingival tissue proliferation over the surface of the socket.

The histologic changes observed in the extraction wounds in the dog used as a control appeared to be about the same as those which have been reported in previous studies. The histologic changes found in the control dog in the healing of extraction wounds were as follows:

Fourth Postextraction Day • The socket was filled with an organizing clot extending to the apex, the lateral walls and the surface of the socket. The center of this organizing clot showed a uniform mass of erythrocytes. Remains of a degenerating periodontal membrane were seen along the socket wall. The organization started by a proliferation of the fine capillaries from the open marrow spaces of the socket wall. The clot filled the width of the socket wall. There was definite osteoclastic activity at the alveolar crest of the socket. Bony resorption also was seen at the apical fourth of the socket. An extremely slight proliferation of the gingival epithelial tissue was seen at this time.

Eleventh Postextraction Day • The blood was replaced by a highly vascular granu-

lation tissue which was traversed at the apex and the lateral walls by bony trabeculae. The vascularity of the whole tissue was pronounced. Osteoclastic activity was seen at the alveolar crest of the socket as well as at the apex. New bone appeared to be deposited along the lateral walls and the apex of the socket.

Fig. 2 • Left: Penicillin-treated extraction wound after nine days. Socket is covered by a closed layer of epithelium. The socket is completely filled by an ossifying vascular connective tissue in the center of which a blood clot is still present

Right: Penicillin-treated extraction wound after 22 days. The socket is covered by an epithelial-lined mucosa. The socket is filled by a nicely arranged network of new bone trabeculae which surround partly fatty and fibrous marrow

There was some proliferation of the gingival epithelial tissue over the socket (Fig. 3, right).

CONCLUSIONS

The microscopic findings of the histologic changes which took place in the healing of the extraction wounds of dogs after various antibiotics and hemostatics were used show a definite and important histologic difference in the healing process in contrast to that reported for normal healing.

The material introduced into the socket in three cases remained in the socket as a well-tolerated foreign body over a definite period of time. Particles of the penicillin tablet were noted in the two-day-old extraction wound. On the sixteenth postextraction day, the socket treated with sulfanilamide-sulfathiazole showed foreign material, while there still was evidence of a foreign substance in the 22 day old extraction wound of the dog treated with an oxidized-cellulose. Thereby it was shown that these materials, when introduced into the sockets, remain for various lengths of time and do not, as some may claim, become resorbed immediately, nor do they accelerate the healing process.

Another disadvantage that becomes manifest when a comparison is made with normal healing is that there is a definite breakdown and even a prevention of the blood clot formation when some of the substances are introduced into the socket immediately after extractions. This was the case when sulfanilamide-sulfathiazole cones and oxidized-cellulose were used. Therefore, it can be said these two substances retarded the healing from the beginning. When penicillin tablets were

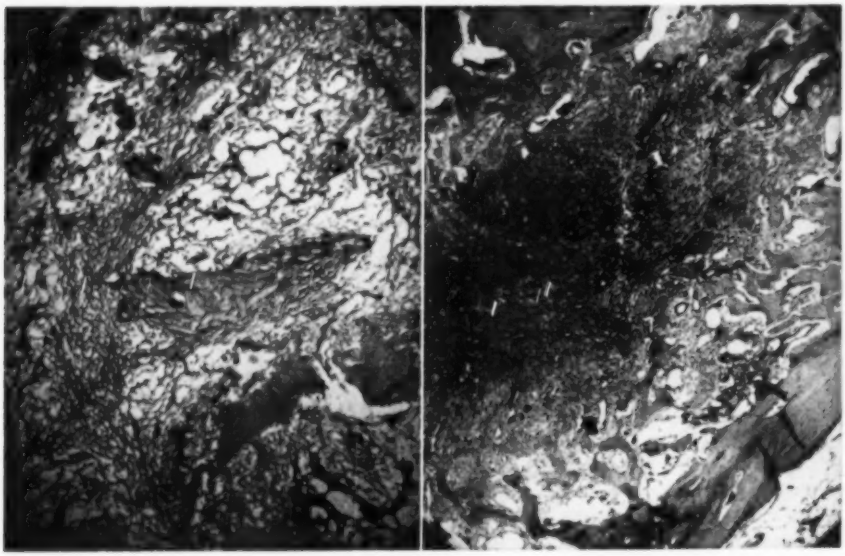


Fig. 3 • Left: Oxidized-cellulose treated extraction wound 16 days old. Foreign material surrounded by a degenerating connective tissue. Right: Untreated extraction wound 11 days old. Apical area of the socket filled with a blood clot undergoing organization with bone formation originating from the bony wall

used, the sockets did not show a significant loss of the blood clot. When sulfanilamide-sulfathiazole was introduced into the socket, the extremely important proliferation of the gingival epithelium over the socket started at the sixteenth postextraction day. Such proliferation of the gingival epithelium was seen first at the eleventh postextraction day when an oxidized-cellulose was used. However, in comparison with the normal healing in dogs where such epithelial proliferation was seen at the second postextraction day, penicillin-treated sockets came closest to normal. The proliferation was seen at the fourth postextraction day when penicillin was introduced. The continuity of the epithelium growing along the surface of the organizing blood clot which fills the socket is of paramount importance because it closes the healing wound thereby preventing bacterial and mechanical disturbances.

Euler,[1] Claflin[2] and the others first noted bone formation on the fourth and fifth postextraction day. In the present study bone formation appeared later in some cases. When sulfanilamide-sulfathiazole was used it was not until after the sixteenth postextraction day that new bone was found. In the dogs treated with oxidized-cellulose, new bone was observed on the eleventh postextraction day. When penicillin was introduced in the wound, new bone was found on the fourth day as in the untreated tooth sockets.

Clinical evaluation of this experimental work shows definite indications and contraindications for the use of the drug under study. The use of sulfanilamide-sulfathiazole definitely retards healing by as much as three weeks. The use of penicillin, while it remains as a foreign body for a comparatively short time, does not retard the healing process. Therefore, this is the antibiotic of choice for insertion into the extraction wound. Oxidized-cellulose, while it is an excellent hemostatic, retards healing as much as two weeks and should be used only in those few cases where it is indicated.

SUMMARY

Some of the drugs used in this experimental study acted as a foreign body and caused retardation of the healing. They should be used only when indicated and not routinely. Penicillin is the drug of choice when an antibiotic is needed.

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Writing • Reading maketh a full man; conference a ready man; and writing an exact man. *Francis Bacon.*

Value of implantation of certain chemotherapeutic agents in sockets of impacted lower third molars

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A review of the literature shows that a variety of opinion exists concerning the value of the use of locally implanted chemotherapeutic agents in tooth sockets, particularly after the extraction of lower third molars. This procedure has been praised by many,[1-18] condemned by some[19-28] and questioned by most surgeons. Most reports are based on clinical observations with few controls. There is a paucity of objective and quantitative data. It was the purpose of this study to determine, if possible, the value of the local use of these agents utilizing both clinical and bacteriological criteria.

SERIES I

Methods and Materials • The first series, composed of 60 patients, was investigated to determine the value of implantation of sulfathiazole into the sockets of impacted lower third molars in patients aged 15 to 60.

In order to keep the evaluations unbiased, three different powders (one of which was sulfathiazole) were used. They were all similar in gross physical characteristics and were designated as Powder 1, 2, and 3. The dentist was unaware of the composition of these powders and used them unselectively. The unknown powders were later identified as follows:

Powder 1—Sulfathiazole (used in 26 cases).

Powder 2—Lithium carbonate (used in 11 cases).

Powder 3—Corn flour (used in 8 cases).

Powders 2 and 3 were used as controls. In 15 instances, no powder was used. These were interspersed among the experimental group as a blank control. There was no selection of patients.

Presented before the Chicago Section, International Association for Dental Research, October 26, 1951.

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The criteria of assessment were (1) the number of patients in each group who developed postoperative complications, and (2) the number of days required for healing.

OBSERVATIONS

Subjective Impressions • The dentist who operated on all of the 60 patients felt, on the basis of gross clinical observation, that the implantation of Powder 1 (sulfathiazole) in impacted lower third molar sockets was beneficial inasmuch as the healing seemed to be more rapid and clinically more satisfactory; that is, clinically there seemed to be fewer and less severe postoperative reactions in terms of pain, swelling and discomfort, and the incidence of loss of the blood clot and number of postoperative visits seemed to be reduced. The postoperative reactions were less severe in those patients in whom Powder 1 (sulfathiazole) was used. In fact, the difference was so striking that in an exceedingly short time the dentist suspected that Powder 1 was sulfathiazole. At the same time it was observed that those patients who received Powder 3 (corn flour) had a considerably greater number and more severe postoperative reactions, so the use of this powder was discontinued. This accounts for the small number of patients in whom Powder 3 was used.

All the factors which were evaluated and which might have influenced the results were tested and found to be similar in the experimental and control groups: there were no statistically significant differences in age, sex and race of patient, the tooth position, the technic of removal, time for operation, amount of bone removed, communication of the tooth with the oral cavity and whether the tooth had caries or periodontal infection.

Quantitative Data • The rate of postoperative complications appeared to be less in the group receiving sulfathiazole (1 in 26 cases) as against the three control groups (2 each in 8, 11 and 15 cases, or 6 in 34 cases) (Table 1).

While the number of patients in each group was small, the difference seemed to be sufficiently great to warrant statistical analysis. The three control groups were therefore combined and tested against the experimental group. The rate of postoperative complications in the control group was 17.6 per cent (6 in 34) while the rate in the sulfa group was only 3.8 per cent (1 in 26). Statistically this difference was likely to be present in 90 chances out of a hundred ($p \pm 0.10$). Even in small samples of biologic data of this nature where the limits of con-

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Table 1 • Results from the local implantation of sulfathiazole powder in sockets of impacted lower third molars

	Sulfa group	Combined controls	Controls		
			No powder	Lithium carbonate	Corn flour
No. cases studied	26	34	15	11	8
No. postoperative complications	1	6	2	2	2
Rate of postoperative complications	3.8%	17.6%	13.3%	18.2%	25.0%
$p =$	0.10*				
Average no. days required for healing†	6.7	12.55	11.9	12.6	13.6
Standard deviation	4.7	15.1	14.9	14.9	17.5
Difference between the means	5.85 days‡				
Difference required for statistical significance	8.25 days				

*The chances of this difference being significant are 90 out of 100.
†Observations made every five days.
‡This difference is not significant.

fidence are low, this difference may be judged to be significant.

The number of days required for healing was estimated grossly by the dentist on the basis of weekly postoperative visits by the patient and by clinical evaluation of the condition of the socket of the extracted tooth. This procedure is admittedly subject to great error and wide variations in judgment. At the time, however, no better method of measuring the rate of healing of the sockets was available.

The number of days required for healing appeared to be significantly different between the group which received sulfathiazole and the control group (Table 1). The 15 patients in whom no powder was implanted required an average of 11.9 (±14.9) days for clinical healing to occur. The 26 patients in whom sulfathiazole was implanted required only 6.7 (±4.7) days. The wide range in the number of days required for healing in each group and the large standard deviation made these differences doubtful. Statistical testing revealed that the differences were, actually, not significant (Table 1).

Surprisingly, the powder controls (lithium carbonate and corn flour) appeared to retard healing slightly (12.6±14.9 days; 13.6±17.5 days). The lithium carbonate appeared to be less irritating than the corn flour (Table 1).

SERIES II

After the evaluation of the results obtained in the first series was completed, it was felt that the criteria used (number of patients in each group with complications and the average number of days required for healing) were not sufficiently reliable for final conclusions. A second series of 50 patients was therefore investigated using more complete criteria of evaluation, and a different selection of drugs.

In this series the value of other chemotherapeutic agents was investigated as follows:

1. Sulfanilamide—0.25 Gm. (in 9 cases).
2. Penicillin—crystalline penicillin G potassium 5,000 units, with lactose as a diluent (in 15 cases).
3. Sulfanilamide and penicillin—crystalline penicillin G potassium 5,000 units plus sulfanilamide 0.25 Gm. (in 12 cases).
4. Control—no powder used (14 cases).

In each instance a measured amount of the powder was incorporated into the socket and clot by means of an insufflator tube.

A much more extensive and detailed clinical chart was designed in an effort to discover those criteria which would permit the findings to be evaluated more critically.

The following factors were assessed and recorded:

1. Age, sex and race of patient.
2. The tooth—position, visible or not, caries, pulp vitality.
3. The condition of the contiguous soft tissues—preoperative and postoperative.
4. Technic used—automatic chisel, chisel and mallet, elevator, forceps.
5. Amount of bone removed.
6. Difficulty of removal and time required.
7. Material used in socket.
8. Maximum amount of opening between incisal edges of teeth—preoperative and postoperative.
9. Pain—subjective estimation and amount and type of anodyne used (acetylsalicylic acid).
10. Amount of postoperative bleeding.
11. Amount of postoperative swelling.
12. Postoperative difficulty in swallowing.
13. Healing of socket—uneventful or infected.
14. Number of postoperative visits.
15. Oral temperature—preoperative and postoperative.
16. Bacteriological studies (smears and blood agar cultures)—preoperative, postoperative (every second day, until healing was complete).

All reactions were rated as being absent, mild, moderate or severe.

OBSERVATIONS

In the four groups studied, the mean age was essentially the same (25 years) with a range from 15 to 48 years. There were 34 white and 16 negro patients in this sample with a similar distribution of men and women in each of the four groups.

Thirty-one of the teeth removed were on the right side and 19 were on the left. The types of impaction were as follows: 11 were in a vertical position; 13 were in a distoangular position; 25 were in a mesioangular position and one was in a horizontal position. These were equally distributed among the four groups.

The caries incidence was similar in the four groups studied. In most instances (32) the crown of the impacted tooth was partially visible; in 18 patients the crown was completely covered. The time used for the removal of these teeth varied from one to 30 minutes. The amount of bone removed at the time of surgery varied from none to considerable. The soft tissues in the immediate vicinity of the impacted teeth to be removed were in normal condition in 31 of the cases. In 19 there was slight inflammation present. In all of the instances cited there was an equivalent distribution of the numbers of cases in each of the four groups.

Examination of the data (Table 2) shows that no significant differences were found in the postoperative effects when no powder was used or when penicillin, sufanilamide or a combination of both was used. Patients in whom sulfanilamide was used appeared to have a shorter postoperative bleeding period. On the other hand, these patients showed a greater amount of trismus (as judged by a decrease in mouth opening). Twenty-five sockets retained the blood clot and 25 lost it. In five of these patients infection developed. Chemotherapeutic agents had been used locally in two of these sockets and nothing in the other three.

As regards other untoward symptoms (Table 2) no serious degree of inflammation, pain or swelling appeared in any of the cases. Most of the cases showed some postoperative inflammation both in the control and medicated groups. The amount of postoperative pain and swelling was negligible throughout. Weighted averages for inflammation, pain and

swelling showed no consistent differences among the groups.

The position of the impacted tooth in the jaw, whether it was partially erupted or completely covered by bone or soft tissue, or whether it was carious or not, made no difference in the postoperative sequelae. Neither did the surgical technic used for its removal (whether chisel, elevator, forceps or any combination), nor the amount of bone removed during the surgical procedure, make any significant difference in the end result.

In determining the amount of postoperative pain, two criteria were used: (1) the amount of anodyne taken by the patient, and (2) the subjective estimation of pain by the patient. These did not always coincide. Neither criterion showed any relation to the chemotherapeutic agent used, however.

Bacteriological Findings • The bacteriological findings also were fairly constant in all mouths. There appeared to be no differences between the experimental and control groups. The technic used was as follows: A smear was taken from the operative field before surgery with a sterile cotton swab after the saliva had been wiped away. This was then streaked on blood agar plates and dropped into broth culture tubes. Both were then incubated for 24 to 48 hours and examined. A similar technic was used immediately after the surgery, the smear being taken

Table 2 • Effects of local implantation of certain chemotherapeutic agents in sockets of impacted lower third molars

		No medication	Penicillin	Sulfanilamide	Penicillin & sulfanilamide
Postoperative inflammation of contiguous soft tissues	0	1	4	2	1
	1	7	11	4	9
	2	4	0	3	2
	3	0	0	0	0
	?	2	0	0	0
	Mean	1.25	0.73	1.11	1.08
Postoperative pain	0	10	14	7	8
	1	1	0	1	3
	2	0	0	1	1
	3	0	0	0	0
	?	3	1	1	0
	Mean	0.09	0.0	0.33	0.41
Postoperative swelling	0	9	13	7	10
	1	3	1	1	1
	2	0	0	0	1
	3	0	0	0	0
	?	2	1	1	0
	Mean	0.25	0.07	0.12	0.25
Postoperative bleeding (hrs.)	Mean	6.5	7.5	3.5	7.3
	S.D.	±6	±7.5	±3.5	±5
Decreased amount of mouth opening (mm.)	Mean	6.0	5.3	15.5	9.5
	Range	0–25	0–30	0–30	0–20
Number of postoperative visits	Mean	4.0	4.0	5.1	4.75
	S.D.	±2	±2	±5	±2

0—None
1—Mild
2—Moderate
3—Severe
?—Data questionable, unreliable or missing

from the socket immediately after the removal of the impacted tooth. Postoperatively, smears were taken from the surface of the wound and also from the socket just under the sutured soft tissue flap. This was done at two to three day intervals until the patient was dismissed.

Subjective Impressions • Again, on the basis of gross clinical observations, some differences could be noted. In five sockets in which chemotherapeutic agents were used (sulfanilamide in one case; penicillin in four cases) the sutured border of the incisions healed by first intention. This fact may be significant clinically, in spite of the absence of statistical reliability. In four of these five cases, the tooth was completely covered by bone or soft tissue, and there was no communication between the tooth and the oral cavity.

DISCUSSION

In the first series of patients apparently excellent results were obtained in those instances in which sulfathiazole was used locally. Closer examination of the data revealed, however, that first of all, the total number of persons tested was too small to make any conclusions final, and secondly, the criteria of assessment of the results (number of postoperative days required for healing and number of instances of postoperative complication) were liable to large errors and therefore unreliable. The use of "control" powders (especially corn flour) in this series might very well have accounted, in part, for the clinical impression of better results with sulfathiazole since corn flour appeared to retard healing slightly.

The large standard deviation around each mean was the result of the fact that observations on the rate of healing were made at approximately five-day intervals. Perhaps a real difference could have been demonstrated statistically if the observations had been made at shorter intervals.

The results in the second series of cases were evaluated more critically and over a longer period of time. Here the number of sockets which healed uneventfully and those which had some postoperative complications were divided equally. No differences could be demonstrated statistically by any of the criteria used. This investigation showed again the necessity for critical evaluation of clinical impressions. The clinical impressions were definitely in favor of the chemotherapeutic agents. Since these subjective impressions could not be supported by concrete objective data, however, it must be concluded that the impressions were unreliable and no significant differences actually existed when these chemotherapeutic agents were or were not used. Clinical impressions may be fallacious, however, and must be analyzed to get to the truth.

CONCLUSIONS

The value of the local implantation of certain chemotherapeutic agents in the sockets of the impacted lower third molars was assessed in a total of 110 patients. Although the clinical impression was that the local use of sulfonamide drugs or penicillin or a combination of both promoted healing and lessened the incidence of postoperative complications, statistical analysis of the objective data did not support this. The present study reveals that the local implantation of these chemotherapeutic agents in the sockets of impacted lower third molars is not justified. Therefore, the local use of chemotherapeutic agents in tooth sockets has been discontinued at the oral surgery clinic of the University of Illinois College of Dentistry.

Local implantation of aureomycin in extraction wounds: a preliminary study

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Healing is essentially the same in all wounds. Investigators, who have based their findings on histologic study, agree that interference with the blood clot in the tooth socket is one of the reasons that normal healing does not occur after the extraction of teeth. The aim of every practitioner is to obtain uncomplicated healing after extractions. In order to accomplish this, many agents have been implanted in tooth sockets. This has been done in the hope that they would be incorporated with the blood clot and consequently hasten the formation of a firm clot, protect against bacterial contamination, combat local infection and promote uninterrupted healing.

REVIEW OF LITERATURE

Although a review of the literature does not reveal any previous reports regarding the implantation of soluble aureomycin tablets (50 mg.) in tooth sockets, Stewart and Roth[1] reported that in 13 instances of acute abscess where teeth were extracted several 25 mg. aureomycin cones were placed in the sockets, held in place with absorbable gelatin sponge (Gelfoam) and sutured. They reported that the aureomycin cones were not absorbed; postoperative examination from 6 to 12 weeks later revealed that a typical foreign body reaction had occurred.

PURPOSE OF INVESTIGATION

The purpose of this preliminary investigation was to study the effect of local implantation of the 50 mg. soluble aureomycin tablets in lower bicuspid and molar tooth sockets. This was done in the hope of finding a substance that would be incorporated with the blood clot and thus effect bacteriostasis and clot support. A failure of blood clot formation, or its early loss, leads to complications in which areas of the denuded alveolar bone become necrotic and are slowly eliminated by undermining resorption.[2] This results in alveolar osteitis or dry socket. These terms are used to describe a condition in which the blood clot disintegrates, suppuration is absent, a foul odor is present, and a radiating type of pain is felt in the region of the ear, in the socket, and frequently down the side of the neck. The symptoms usually begin on the second or third day after the extraction of a tooth and pain persists over a period of days.

Presented before the Chicago Section of the International Association for Dental Research, October 26, 1951.

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The problem was investigated from the clinical aspect, since no clinical study using the soluble 50 mg. aureomycin tablets had been reported previously in the literature.

METHOD OF STUDY

All the persons observed in this study were clinic patients of the oral surgery department of the Northwestern University Dental School. The cases selected for study were those in which routine extractions of lower bicuspid and molar teeth had been performed. Since approximately 90 per cent of the instances of alveolar osteitis occur in the posterior sockets of the mandibular arch, the study was restricted to this region. Every other patient was treated with the aureomycin implant, and there was no attempt to group them according to type of extraction performed.

There were two groups, 103 patients in each group. In one group the soluble 50 mg. aureomycin tablets were implanted immediately after extraction; the other group was used as controls. Two tablets were implanted in the molar sockets and one tablet was used in each bicuspid socket. The material, in tablet form, was placed in the deepest portion of the wound immediately after the extraction. Care was taken to avoid contamination of the socket with saliva. A sterile cotton pliers was used to mix the soluble aureomycin tablet with the blood in the socket, after which a sterile gauze pack was adapted over the wound and the patient instructed to maintain biting pressure for at least a half hour. The usual postoperative instructions also were given to the patients. The same procedure was followed, with the exception that no antibiotic was implanted for patients in the control group. On all occasions in the control group, a sterile cotton pliers was used to stimulate the tooth socket mechanically to insure the formation of a firm blood clot.

Data recorded for patients included age, sex, cause for extraction, tooth or teeth removed, and the degree of trauma involved during the extraction. The patients were instructed to return at the end of 24 hours, 48 hours, and one week for postoperative observation and questioning. At this time, the presence of pain, the amount of swelling, and the condition of the blood clot were recorded. All patients were advised to return immediately if a throbbing or pulsating pain began, or if they noted anything unusual between the time of extraction and the examinations.

Postoperative pain is difficult to classify because pain is a subjective symptom and patients react differently to surgery. The evaluation of pain was determined by questioning the patient and then recording the findings. "Absence of pain" was recorded when the patient expressed absolutely no discomfort. A recording of "slight pain" was made when a normal amount of pain was reported by the patient in relation to the surgery. When the patient reported pain to be in excess of normal it was classed as "moderate." Pain was termed "severe" if the patient found it necessary to use a maintenance dose of an analgesic drug.

Postoperative swelling was recorded by comparison with conditions previous to the operation and with the contour of the related anatomy on the opposite side of the mouth. A recording of "no swelling" was made when no change in the contour of the face on the side where the extraction had occurred was noted. "Slight swelling" was recorded when noticeable change in the contour of the face was apparent and "moderate swelling" was noted when the swelling was thought to be somewhat in excess of "slight swelling." The recording of "severe swelling" was made when the swelling was greatly increased in size in comparison to the anatomy on the opposite side.

At the end of a week healing progress and the condition of the blood clot were

checked by clinical inspection and recorded. When the blood clot appeared firm, with no evidence of necrosis, and when the clot was wiped with a dry, sterile applicator with no evidence of decomposition, healing was recorded as "normal." Evidence of slight decomposition of the blood clot leaving small areas of denuded bone was recorded as "fair healing." Evidence of decomposition of the blood clot throughout the depth of the socket, accompanied by putrefaction and large areas of denuded bone, was recorded as "no healing."

Each extraction was recorded according to the trauma involved. Trauma was divided into three distinct categories. If a tooth required only forceps for extraction, with the minimal amount of hard and soft tissue damage, minimal trauma was recorded. Moderate trauma was recorded if forceps, elevators and drills were used for the extraction and soft tissue damage was slight. Severe trauma was recorded if the extraction necessitated a surgical approach with some hard and soft tissue damage that required sutures for closure of the wound.

Table 1 • Instances of normal healing and decomposition of blood clots in aureomycin and control groups

Aureomycin cases

Difficulty of removal	Total no. operations	Operations resulting in normal healing	Operations resulting in decomposed blood clot
Minimal trauma	68	65	3
Moderate trauma	26	23	3
Severe trauma	9	9	0
Total	103	97	6

Control cases

Difficulty of removal	Total no. operations	Operations resulting in normal healing	Operations resulting in decomposed blood clot
Minimal trauma	65	57	8
Moderate trauma	27	21	6
Severe trauma	11	9	2
Total	103	87	16

RESULTS

Observations regarding normal healing and condition of the blood clot are shown in Table 1. Six instances of extraction in the aureomycin groups resulted in partially decomposed blood clots. In three of these patients, one sedative dressing was required for alleviation of pain, while it was unnecessary to use a sedative dressing in the other three patients. No hindrance in healing resulted in the aureomycin group when severe trauma was necessary to extract teeth (nine cases).

There were 14 partially decomposed blood clots in the 103 patients in the control group, while two tooth sockets showed total decomposition of the blood clot. Nine decomposed blood clots resulted when minimal trauma was exercised, five instances when moderate trauma was used, and total decomposition of blood clots was seen in two instances when severe trauma was necessary for the extraction. An average of two sedative dressings was necessary in 12 of the patients, while one patient required six postoperative treatments. Three patients in the control group appeared with a partially decomposed blood clot, although a sedative dressing was not necessary to alleviate the pain.

During this preliminary investigation it was observed that on several occasions parts of the aureomycin tablets were present in the blood clot one week postoperatively. On no occasion was healing found to be inhibited and no foreign body reaction was observed.

Two patients who had received aureomycin therapy returned to the clinic after extractions with a yellowish-brown discoloration of the tongue. Neither patient complained of a sore tongue. The dis-

coloration disappeared seven days postoperatively.

At both the 24-hour period and the one-week period the group of control cases was less satisfactory than the group of cases treated with aureomycin tablets (Table 2). At the 24-hour period the aureomycin group showed an advantage of about 10 per cent in the matter of pain and swelling. At the one-week period, a similar advantage was present in the matter of pain, swelling and healing.

STATISTICAL EVALUATION

Chi-square method was used in order to evaluate the recorded data[3] (Table 3). For this purpose it was necessary to group together the degrees of pain, swelling and clot decomposition and compare these with the absence of pain, no swelling and normal clot formation.

Any chi-square larger than 3.841 was regarded as significant, while any chi-square value above 6.635 was highly significant.[4] Consequently the following statistical interpretations were made (Table 3).

The use of soluble aureomycin tablets resulted in a highly significant decrease in the amount of pain and a significant decrease in swelling at the one week interval. A highly significant reduction at the end of a week in the incidence of decomposed blood clots resulted when the soluble aureomycin tablets were used in the socket.

Table 2 • Presence of pain, swelling and decomposed blood clot in 103 medicated and 103 unmedicated extraction cases

	Aureomycin group		Control group	
	24 hours	1 week	24 hours	1 week
Pain	84	5	93	21
Swelling	61	3	70	11
Decomposed blood clot	—	6	—	16

Table 3 • Comparison of aureomycin group with control group by chi-square method

	24 hours	1 week
Pain	3.25	11.27
Swelling	1.698	4.905
Healing	——	6.852

CONCLUSIONS

Based on the evidence obtained in this preliminary investigation the following conclusions were drawn:

1. Clinical observation and statistical evaluation indicate that soluble aureomycin tablets (50 mg.) reduced the incidence of decomposition of blood clots in sockets as well as lessened the incidence of postoperative pain and swelling at the one week interval.

2. Clinical evidence of foreign body reaction was not observed, and the presence of particles of the soluble aureomycin tablets used did not seem to delay healing.

3. There was no evidence of a toxic reaction resulting from the local implantation of the soluble aureomycin tablets.

4. The simplicity of application of the method of administering aureomycin tablets makes its use practical for any dental practitioner.

5. The results of this preliminary study indicate that the soluble aureomycin tablets deserve an extensive clinical trial.

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Studies on excretion of antibiotics in human saliva
I. Penicillin and streptomycin

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The purpose of this study was to measure and compare the concentrations of antibiotics in the blood serum and in the saliva (or more properly, spittle) after their parenteral administration. Part I is an investigation of the penicillin and streptomycin concentrations found in blood serum and saliva at various intervals after parenteral injection of a single dose containing both antibiotics. This investigation was undertaken because antibiotic levels in the saliva may be of significance in the prevention of bacteremias after extraction of teeth.

Previous studies on the prophylactic administration of antibiotics for the purpose of preventing bacteremias have emphasized chiefly optimum blood serum levels. No adequate consideration has been given to antibiotic concentrations in the saliva. Results reported to date have been mainly qualitative in nature.

Herrel[1] states that fairly adequate amounts of penicillin reach the saliva after systemic administration. No quantitative comparisons of concentrations in saliva and blood serum are presented.

Long[2] claims that penicillin is excreted in saliva only if sufficiently large doses are administered (500,000 units in 24 hours). He states it is present in the saliva only during the initial phase; penicillinase formed by bacteria in the mouth soon destroys it. Measurements of penicillin concentrations in the saliva and measurements of the rate of destruction of penicillin are not stated.

One study[3] has been reported showing the elimination of streptomycin through the saliva.

It has been shown[4,5] that bacteria, particularly the *Streptococcus viridans* group, which have recovered from the toxic effects of penicillin are extraordinarily susceptible to the action of the body's defense mechanism. This fact has a bearing on the present investigation because it shows the significance of even sublethal concentrations of penicillin.

From the research laboratories of the Jewish Hospital, Philadelphia. Study aided by a grant from Mary L. Weinberger Research Fund.

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2. Long, D. A. Effect of penicillin on bacterial flora of the mouth. Brit. M. J. 2:819 (Nov. 22) 1947.

3. Nassi, L., and Zerini, F. Sulla eliminazione della streptomicina attraverso la saliva. Boll. Soc. ital. biol. sper. 25:54 (Jan.-Feb.) 1949.

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PROCEDURES

Administration of Antibiotics • Patients were selected who had not been on antibiotic therapy for at least ten days. A single dose, consisting of a mixture of 1 Gm. of dihydrostreptomycin and 400,000 units of penicillin (100,000 crystalline sodium penicillin and 300,000 procaine penicillin),[6] was administered intramuscularly to each patient.

For purposes of checking, a few patients were given the 400,000 units of penicillin without the streptomycin.

A third group of subjects, chosen from laboratory personnel, received no antibiotic therapy and were used as controls.

Collection and Preliminary Treatment of Samples • Samples of blood serum and saliva, approximately 5 ml. of each, were collected at 0.5, 1, 2, 4, 6 and 8 hours after administration of the antibiotics.

Blood specimens were collected; the clotted blood was centrifuged at 1,500 rpm for ten minutes; and the separated serum was stored in the freezing compartment of a refrigerator for assay the following day.

Saliva specimens were collected in sputum bottles after salivation was induced in the patients by having them each chew on a half-inch block of paraffin. The saliva samples were immediately frozen by immersing the bottles in a mixture of solid carbon dioxide and 95 per cent ethyl alcohol. They were stored at —15°C. until the following day. After defrosting at room temperature, they were centrifuged at 1,500 rpm for 15 minutes, and the supernatant liquid was used for the assay.

Assay of Antibiotics in Serum and Saliva • Blood serum and saliva specimens were assayed turbidimetrically by a method based on the technic of Osgood and Graham[7,8] as modified by Whitlock, Hunt and Tashman.[9] In this method an organism sensitive to the antibiotic is cultured in a control tube and also in a tube containing the antibiotic. Osgood has demonstrated that the concentration of the antibiotic is proportional to the square of the difference between the turbidity in the control tube and the turbidity in the tube containing the antibiotic. Definite amounts of antibiotic are added to physiologic saline and are assayed according to this principle; the data thus obtained are used to construct standard curves. Turbidimetric data obtained by examination of cultures from body fluids are evaluated by comparison with the standard curves.

Table 1 • Concentration of penicillin and streptomycin in the physiologic saline added to the standard tubes

Standard tube	Penicillin units per milliliter		Streptomycin mcg. per milliliter	
	Saliva	Serum	Serum	Saliva
1	0.4	1.6	20	10
2	0.1	0.8	10	5.0
3	0.025	0.4	5	2.5
4	0.0125	0.1	2	1.25
5	0.0063	0.025	..	0.63

Modifications of Method • Materials needed and method of calculating results were the same as described by the forementioned investigators,[9,10] except for a difference in the concentrations of streptomycin and penicillin for saliva assay in the physiologic saline used to determine the standard curves (Table I).

6. Penicillin (S-R) and streptomycin were supplied through the courtesy of Parke Davis and Company.

7. Osgood, E. E., and Graham, S. M. Simple, rapid method for assay of bactericidal and bacteriostatic agents, with technics for assay of penicillin, streptomycin, neoarsphenamine, mapharsen and other trivalent organic arsenicals. Am. J. Clin. Path. 17:93 (Feb.) 1947.

8. Osgood, E. E. Assay of penicillin, streptomycin, trivalent organic arsenicals, and other bactericidal agents; technique based on original application of mathematical principles with adaptation for all assay purposes. J. Lab. & Clin. Med. 32:444 (April) 1947.

9. Whitlock, C. M., Jr.; Hunt, A. D., Jr., and Tashman, S. G. Simplified turbidimetric method of aureomycin assay for capillary blood and other body fluids. J. Lab. & Clin. Med. 34:1682, 1949.

10. Whitlock, C. M., Jr.; Hunt, A. D., Jr., and Tashman, S. G. A single, simple turbidimetric method for assay of aureomycin, chloramphenicol, penicillin, streptomycin and terramycin in capillary blood and other body fluids. J. Lab. & Clin. Med. 37:155 (Jan.) 1951.

Since the two antibiotics were administered simultaneously, it was necessary to devise a method for assaying one antibiotic in the presence of the other.

Assay of Streptomycin in the Presence of Penicillin • The streptomycin-sensitive organism used was Oregon J strain of *Staphylococcus aureus,* American Type Culture Collection No. 9801. Penicillinase was added to one aliquot prior to the test to inactivate any penicillin present.

Assay of Penicillin in the Presence of Streptomycin • The penicillin-sensitive organism used was FDA strain 209 of *Staphylococcus aureus;* this organism had been made resistant to 100 mcg. per milliliter of streptomycin by multiple transfer to increasing amounts of streptomycin.

Some salivas possess a nonspecific inhibitory effect on the growth of the test organism. The discrepancy, however, is negligible since a difference of 5 Klett units in the reading of the instrument is equivalent to a concentration of 0.006 units per milliliter of penicillin and 0.31 mcg. per milliliter of streptomycin. (Actually the maximum value for streptomycin would have been 0.63 mcg. per milliliter had the antibiotic not been diluted 1:2 with penicillinase.)

Table 2 • Shows the blood serum levels in 34 patients after the first hour and the saliva levels in a corresponding 31 patients after a single intramuscular injection of 400,000 units of penicillin and 1 Gm. of dihydrostreptomycin. In six instances, 0.5 hour levels were determined.

	Units of penicillin per milliliter					
	Blood		Saliva	Blood		Saliva
	1 hr.	½ hr.	1 hr.	1 hr.	½ hr.	1 hr.
	1.8	....	....	4	0.000	0.027
	1.6	....	....	3.2	0.0125	0.022
	0.4	....	....	1.8	.	0.030
	1.9	....	0.030	2.3	0.0125	0.035
	2.3	....	0.031	3.2	....	0.017
	2.3	....	0.030	3.2	....	0.0125
	2.1	....	0.34	4.2	....	0.025
	2.4	....	0.0125	3.8	....	0.025
	1.8	....	0.024*	4.0	....	0.031
	3.2	....	0.028	2.8	....	0.034
	3.2	....	0.024	2.3	....	0.027
	4.0	....	0.029	4.2	....	0.030
	4.0	....	0.027	4.0	....	0.025
	3.2	....	0.028	3.8	....	0.020
	3.6	0.000	0.030	1.7	....	0.058
	1.1	0.025	0.027	1.6	....	0.040
	4.0	0.000	0.034	3.8	....	0.062
Range	4.2	0.025	0.34			
	0.4	0.000	0.0125			
Mean	2.84	0.0083	0.029			

*Bloody specimen.

Table 3 • Shows concomitant levels in blood and saliva in 13 patients at various time intervals during the first eight hours.

	Units of penicillin per milliliter							
	2 hours		4 hours		6 hours	8 hours		
	Blood	Saliva	Blood	Saliva	Saliva	Blood	Saliva	
	1.74	0.1500	1.10	0.0230	.	0.05	0.0000	
	2.20	0.0090	0.87	0.0060	0.0055	0.56	0.0000	
	2.80	0.0250	1.10	0.0190	0.0190	....	0.0075	
	1.74	....	0.92	0.0240	0.0055	0.71	0.0000	
	1.84	0.0260	1.10	0.0550*	0.0230	0.56	0.0090	
	2.80	0.0100	1.12	0.0050	0.0050	0.80	0.000	
	2.0	0.0125	1.00	0.0070	0.0058	0.52	0.000	
	2.40	0.0074	1.12		0.0064	0.52	0.0060	
	3.20	0.0082	1.09	0.0080	0.0063	0.94	....	
	3.20	0.0100	1.30	0.0050	0.0050	....	0.000	
	....	0.0125	....	0.0076	0.0069	....	0.000	
	....	0.0250	....	0.0120	0.0066	....	0.000	
	....	0.0190	....	0.0110	0.0070	....	0.0030	
	....	0.0125	....	0.0074	0.0063	....	0.0030	
Range	3.20	0.15	1.30	0.0550	0.0230	0.94	0.0090	
	1.74	0.0074	0.87	0.0050	0.0050	0.05	0.0000	
Mean	2.39	0.025	1.07	0.015	0.0083	0.575	0.0022	

	Saliva		Blood	
	Cases	Mean	Cases	Mean
½ hr.	6	0.0083		
1 hr.	31	0.0290	34	2.84
2 hr.	13	0.0250	10	2.39
4 hr.	13	0.0150	10	1.07
6 hr.	13	0.0083		
8 hr.	13	0.0022	8	0.575

*Concentration higher at 4 hour level than at 2.

RESULTS AFTER ADMINISTRATION OF PENICILLIN

Blood Serum • One hour after administration of the penicillin-streptomycin mixture, the number of units of penicillin per milliliter of blood serum was as follows: average for 34 adult patients, 2.84; highest, 4.20; lowest, 0.40. The peak level

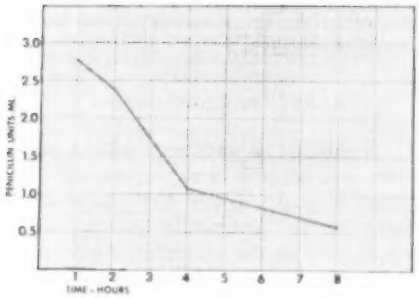

Fig. 1 • Average blood serum levels of penicillin (based on Table 2) after intramuscular administration of 400,000 units of penicillin and 1 Gm. dihydrostreptomycin

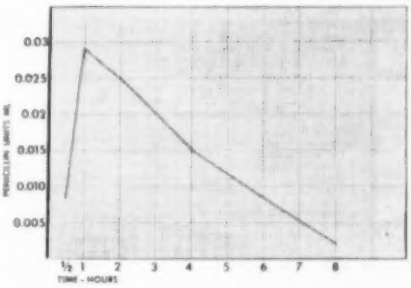

Fig. 2 • Average saliva levels of penicillin (based on Tables 2 and 3) after intramuscular administration of 400,000 units of penicillin and 1 Gm. dihydrostreptomycin

was reached in the first hour; the peak was sustained for two hours. At the end of the fourth hour, there was about a 60 per cent drop. At the end of the eighth hour, the average was 0.575 units per milliliter (Tables 2 and 3 and Fig. 1). Tables 2 and 3 show the number of cases for each interval of time and the concomitant penicillin concentrations in blood serum and saliva.

Saliva • One half hour after administration of the penicillin-streptomycin mixture, no penicillin could be detected in the saliva of most of the patients, although in a few instances concentrations of 0.0125 to 0.025 units per milliliter were observed. At the end of one hour, however, the concentration of penicillin in units per milliliter of saliva was as follows: average for 31 patients, 0.029; highest, 0.062; lowest, 0.0125. The peak level was reached in the first hour; after that there was a considerable drop. Detectable amounts of penicillin were present at the end of six and eight hours (Tables 2 and 3 and Fig. 2).

The rate of destruction of penicillin depends on the concentration, being greater at lower concentrations. At the peak concentration of 0.062 units per milliliter, 50 to 55 per cent of the penicillin is destroyed by the end of the second hour. The rate of destruction, however, is no faster in saliva than in water. Figures 3 and 4 illustrate the rate of destruction at different concentrations of penicillin. This suggests, therefore, that penicillin is not affected by penicillinase-producing organisms or other enzyme action.

One hour after administration of penicillin without streptomycin to a small group of patients, the concentration of penicillin in the saliva was about the same as it was for the group receiving both penicillin and streptomycin.

RESULTS AFTER ADMINISTRATION OF STREPTOMYCIN

Blood Serum • One hour after administration, the number of micrograms of streptomycin per milliliter of blood serum was as follows: average for 34 patients, 19.3; highest, 32.0; lowest, 4.0. The level was sustained for two hours. At the end of the fourth hour, there was a 50 per cent drop. At the end of the eighth hour, four micrograms per milliliter were still present (Tables 4 and 5 and Fig. 5).

Saliva • Concentrations of streptomycin in saliva were almost as high at the end of one half hour as they were at the end

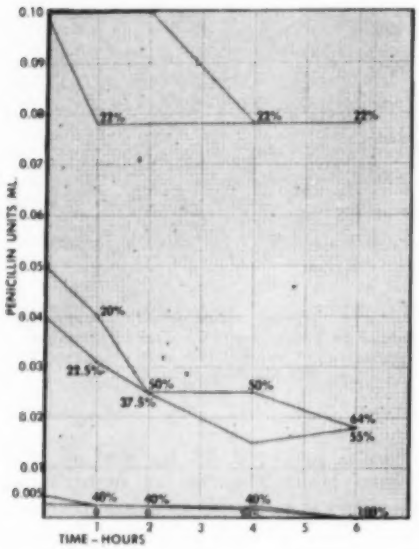

Fig. 3 • Shows rate of destruction of crystalline penicillin in water at 37° C. at various concentrations. These experiments were run in duplicate. The variations in top graph are within the range of experimental error

of one hour. One hour after administration, the number of micrograms of streptomycin per milliliter of saliva were as follows: average for 31 patients, 2.9; highest, 4.3; lowest, 1.1. Peak levels were obtained in the first hour. At the end of the second hour, there was a drop of about 40 per cent (Tables 4 and 5 and Fig. 6).

Concomitant Antibiotic Levels in Serum and Saliva • No correlation between penicillin levels in blood serum and saliva was observed. At the end of the first hour, a low level of 1.7 units per milliliter of blood was accompanied by a high level of 0.058 units per milliliter in the saliva; a high level of 4.2 units per milliliter in the blood was accompanied by a low level of 0.025 units in the saliva. Similarly, no relationship was observed between concentrations of streptomycin in blood serum and saliva.

SUMMARY AND CONCLUSIONS

1. A mixture of streptomycin and penicillin was administered parenterally to a group of patients, and the concomitant levels of the antibiotics in the blood serum and in the saliva were measured at various intervals after administration.

2. Each patient received a single injection, in accordance with usual therapeutic practice. No attempt was made to study the effect of multiple doses on concentration of antibiotics in the saliva and the blood serum.

3. A technic was used for assaying penicillin in the presence of streptomycin and for assaying streptomycin in the presence of penicillin. This made it possible to economize on the number of patients and the number of blood and

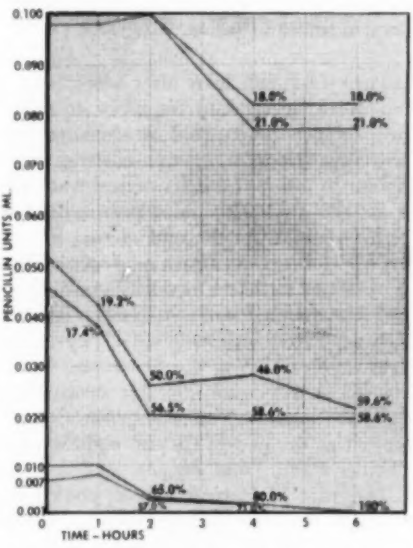

Fig. 4 • Shows rate of destruction of crystalline penicillin in saliva (37° C.) at various concentrations

Table 4 • Shows the blood serum levels in 34 patients after the first hour and the saliva levels in a corresponding 31 patients after a single intramuscular injection of 1 Gm. of dihydrostreptomycin and 400,000 units of penicillin. In six instances, 0.5 hour levels were determined

	Mcg. of streptomycin per milliliter					
	Blood	Saliva		Blood	Saliva	
	1 hr.	½ hr.	1 hr.	1 hr.	½ hr.	1 hr.
	28.0	. . .	. .	18.0	2.5	2.5
	14.4	. . .	. .	16.4	. .	3.0
	4.0	. . .	. .	15.2	2.3	3.0
	14.4	. . .	2.8	28.0	. .	2.0
	13.0	. . .	2.3	32.0	. .	2.0
	8.8	. . .	1.6	16.2	. .	1.4
	28.0	. . .	2.4	24.0	. .	1.48
	13.6	. . .	1.1	28.0	. .	2.8
	12.0	. .	2.0*	20.0	. .	3.6
	16.4	. .	3.2	20.0	. .	4.3
	16.4	. .	3.8	13.0	. .	4.0
	20.0	. . .	2.2	26.0	. .	3.6
	22.0	. .	2.3	13.6	. .	3.0
	15.2	3.00	4.0	14.8	. .	3.6
	22.0	3.28	3.6	15.2	. .	2.5
	26.0	3.28	4.0	26.0	. .	4.0
	28.0	3.3	4.0	28.0	. .	2.3
Range	32.0	3.3	4.3			
	4.0	2.3	1.1			
Mean	19.3	2.8	2.9			

*Bloody specimen.

saliva samples to be collected and examined.

4. The peak concentration of each antibiotic, in the blood serum and also in the saliva, was reached within one hour after administration.

5. The duration of excretion for each of the antibiotics in the saliva was from six to eight hours.

6. The rate of disappearance of both antibiotics was faster in the saliva than in the blood.

7. The concentration of penicillin in the saliva was about the same whether the penicillin was administered by itself or in mixture with streptomycin. It was also found that the rate of destruction of penicillin is no faster in saliva than in water.

8. There was no correlation between concentration of antibiotic in blood serum and concentration of the same antibiotic in saliva. Variations in volume of saliva can account for such lack of correlation.

9. Although the antibiotic concentrations in the saliva (averaging 0.029 units of penicillin and 2.9 micrograms of streptomycin per milliliter of saliva one hour after administration) may not in themselves be of therapeutic value, the combination of the two produces a synergistic or additive or synergistic and additive effect. In another study by the authors,[11] this effect was demonstrated by testing five kinds of organisms. It was also shown[11] that the presence of the combined antibiotics in the saliva in such concentrations as are obtained one hour

11. Bender, I. B.; Pressman, R. S., and Tashman, S. G. The effect of parenteral administration of antibiotics on the bacterial population of the mouth. In press.

Table 5 • Shows concomitant levels in blood and saliva in 13 patients at various time intervals during the first eight hours

	Mcg. of streptomycin per milliliter						
	2 hour		4 hour		6 hour	8 hour	
	Blood	Saliva	Blood	Saliva	Saliva	Blood	Saliva
	16.40	0.86	10.0	0.64	. . .	4.0	0.64
	12.0	1.20	8.40	0.86	0.00	4.0	0.00
	20.10	0.50	16.40	0.64	0.50	. .	0.00
	15.20	. . .	4.40	1.20	0.50	3.4	0.00
	30.00	2.00	15.20	4.20*	0.00	4.4	0.00
	15.20	3.50	10.00	3.10	2.50	4.0	0.00
	22.00	1.25	8.40	. .	0.85	4.4	0.00
	16.40	1.70	8.40	1.25	0.63	3.4	0.00
	18.40	2.50	8.40	1.25	0.85	4.0	. . .
	20.00	3.10	12.00	2.50	1.25	. .	0.00
	. . . .	1.60	. . . .	0.88	0.00	. .	0.00
	. . . .	1.60	. . . .	1.00	0.50	. .	0.00
	. . . .	2.50	. . . .	1.00	0.78	. .	0.00
	. . . .	1.00	. . . .	0.69	0.62	. .	0.00
Range	30.0	3.5	16.40	4.20	2.50	4.0	0.64
	12	0.5	4.4	0.64	0.00	3.4	0.00
Mean	18.57	1.8	10.2	1.47	0.69	3.95	0.049

	Saliva		Blood	
	Cases	Mean	Cases	Mean
½ hr.	6	2.8	. . .	. . . .
1 hr.	31	2.9	34	19.3
2 hr.	13	1.8	10	18.57
4 hr.	13	1.47	10	10.2
6 hr.	13	0.69	. .	. . .
8 hr.	13	0.049	8	3.95

*Concentration higher at 4 hour level than at 2.

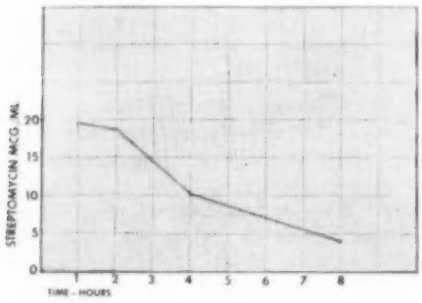

Fig. 5 • Average blood serum levels of streptomycin during the first eight hours (based on Tables 4 and 5) after intramuscular administration of 400,000 units of penicillin and 1 Gm. dihydrostreptomycin

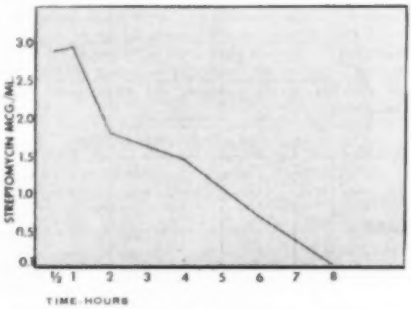

Fig. 6 • Average saliva levels of streptomycin during the first eight hours (based on Tables 4 and 5) after intramuscular administration of 400,000 units of penicillin and 1 Gm. dihydrostreptomycin

after parenteral injection was sufficient to depress the bacterial population count by 65 per cent of both aerobic and anaerobic groups.

10. Trauma from the extraction of teeth permits organisms to gain entry into the blood stream; if antibiotics are administered parenterally as prophylaxis against bacteremia, dental manipulation should be carried out during the period of optimum concentration of antibiotics in the saliva and blood serum; namely, at the end of first hour after administration of the antibiotics.

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Science Documentation • The problems of science documentation continue to grow more acute. Our literature continues to grow faster than our stock of devices, methods, and systems for using, organizing, and controlling documentary material. The addition to library shelves of the primary publications of scientific research proceeds more rapidly than the production of indexes, bibliographies, and abstracts needed for the search, selection, and utilization of these primary documents. The desperate solution forced upon scientists and scholars is to ignore all of those portions of the mass of accumulated informational material that are not easily available through the simplest of communication channels. Perhaps this is inevitable, and perhaps the scientist must become reconciled to a situation in which he can expect to be aware of only a small portion of the results of other workers, past and present, even in his own special field of interest.

However, deeply frustrating as the situation is, scholars have not yet fully accepted defeat. There is continual development of devices, techniques, methods and systems for aiding all of the steps concerned in the process of communication—recording, publication, distribution, storage, classification, indexing, abstracting, search, selection, and reproduction of documentary material. In fact, the number and complexity of the devices and systems developed is now somewhat bewildering. Also, the costs of adequate systems and, in some cases, of devices are so great as to retard their full-scale or even partial adoption. It is seldom realized by the author of a scientific paper that the cost of keeping his contribution in the awareness of other workers, present and future, through indexes, abstracts, and bibliographies alone is likely to be much more than the original cost of publication of his article. *Milton O. Lee, "Science Documentation," News Report, November-December, 1952, p. 84.*

Adjunctive use of intramuscular penicillin injections in treatment of exposed pulps

Ralph M. Roberts, D.D.S., M.S.D., Richmond, Va.

It has been noted many times that pulp cappings are often highly unsuccessful when attempted as a routine procedure on cariously involved teeth in which the pulps are exposed. The examples noted herein were routine cases that were treated in the dental clinic of the Medical College of Virginia. They were taken in sequence whenever caries, as noted on the roentgenograms, appeared as though it approximated the pulp. The instances reported are those in which the pulp was exposed during the regular procedure of cavity preparation.

Patients of all ages were used. No thought was given to the patient's general health, or the care that had been given the teeth or oral cavity prior to the time of the patient's appearance in the clinic.

METHOD OF PROCEDURE

Whenever the roentgenogram of a tooth indicated that the pulp would be exposed during the filling procedure, a rubber dam was placed and regular procedure was followed in the excavation of the carious dentin. If the pulp was exposed during this procedure, the following routine was carried out:

1. The roentgenogram was checked to be sure there were no root end changes.
2. Vitality of the pulp was checked with electro-stimulation and heat.
3. A heavy paste was prepared of calcium hydroxide powder and sterile distilled water. This was placed over the pulpal exposure with as little pressure as possible.
4. The calcium hydroxide paste was covered with an extremely thin coat of wax to act as a protective covering.
5. The cavity then was filled with zinc phosphate cement and the occlusion adjusted if necessary.
6. One cubic centimeter injection was made using an aqueous suspension of procaine penicillin containing 300,000 units of penicillin per cubic centimeter. The injection was usually made in the largest part of the deltoid muscle. This was followed by a second injection 24 hours later.
7. Arrangements were made with the patient to check the vitality of the pulp in 30 days. This was done with the aid of roentgenograms, electric pulp tester and heat. The procedure was repeated in 60 days. If the result of the vitality test stayed within a normal range, the zinc phosphate cement was removed, a zinc phosphate base was inserted and

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the cavity filled with any acceptable filling material.

RESULTS

Forty-four patients were treated, 24 females and 20 males. The teeth treated included 18 molars, 22 bicuspids and 14 incisors, making a total of 54 teeth. A permanent filling was placed in 52 of the 54 teeth. All teeth that were filled with a permanent filling showed what was considered to be normal pulp vitality at the end of a 60 day period. None of the teeth filled showed more than a two point change on an electric pulp tester from the time of the exposure to the time the filling was placed. Ninety-four per cent of the teeth treated presented little or no differences in pulp vitality, using all methods to check as outlined herein.

Two teeth had to be extracted during the experiment. The first incident occurred during a holiday season. During the time the clinic was closed, the zinc phosphate cement filling was dislodged. The patient had to wait for three days before she could return for treatment, at which time some debris was removed from the cavity, the base of the cavity was covered with wax and the crown was refilled with zinc phosphate cement. Forty-eight hours later the patient returned with a story of pain in the region and on examination it was determined that the pulp was becoming necrotic and the tooth was removed. In one other instance the tooth was filled following the regular procedure but the patient experienced intermittent pain for five days. This particular tooth was under heavy functional stress because of a lack of a number of other teeth. The patient was to have a partial denture made. If this tooth were left in the mouth and later should give trouble, the efficiency of the partial denture would be affected. It was decided, therefore, to remove the tooth when it began to present vitality readings that were considered abnormal.

Three years after the initial work was done, an attempt was made to contact all of the 44 patients used in the study and have them return to the clinic. Only 23

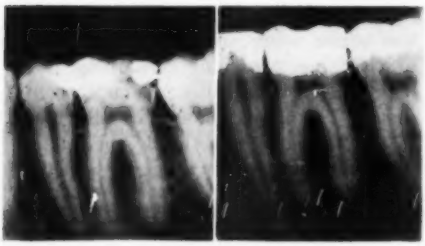

Fig. 1 • Left: Tooth just prior to exposure. Patient is 25 year old man. Right: Three months and four days later. This roentgenogram taken the day filling was placed

Fig. 2 • Left: Tooth 60 days after exposure, immediately prior to placement of fillings. Patient is 32 year old woman. Right: Same tooth a year and seven months later

Fig. 3 • Left: Tooth just prior to exposure. Patient is 34 year old man. Right: Same tooth two years and three months later

Fig. 4 • Tooth just prior to exposure. Patient is 28 year old woman. Right: Same tooth two years and five months after exposure

of the 44 patients could be located and prevailed upon to return so that the results could be checked. Of these 23, one of them had had all of her teeth extracted and was wearing full dentures. One of the patients had had a partial denture made by a private dental practitioner. When this dentist found that one of her teeth had been capped about a year previously he extracted the tooth before making the partial denture. As far as could be determined from questioning the patient, the tooth was asymptomatic at the time of the extraction.

Of the remaining 21 patients it was found that all of the teeth which had been treated and filled at the beginning of the project contained vital pulps. The same testing technics were utilized as during the other testing periods; namely, electro-stimulation of pulp and roentgenographic observation. Examples of the vital pulps after capping are shown in Figures 1, 2, 3 and 4.

CONCLUSION

It would appear after clinical use that the capping of exposed pulps using calcium hydroxide and distilled water, with adjunctive use of intramuscular injection of penicillin subsequent thereto and a second injection 24 hours later, would give satisfactory results. The figures seem to indicate that this procedure might be better than any other method of routine capping that is in use today and should make possible the conservation of many teeth that would otherwise be condemned.

Predatory Men • The sun and the moon and the stars would have disappeared long ago . . . had they happened to be within the reach of predatory human hands. *Havelock Ellis, "The Dance of Life."*

Evaluation of antibiotic agents in the control of lactobacillus counts

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The possibility of controlling lactobacillus counts by the oral administration of antibiotic agents has been an interesting conjecture. The opportunity to engage in a study designed to shed some light on the question developed at the Great Lakes Naval Training Center. The Naval Medical Research Unit No. 4 was initiating an investigation to evaluate antibiotic agents in prophylaxis and treatment of acute respiratory diseases and the Dental Research Facility was invited to participate in the study to determine if the lactobacillus counts of naval recruits could be controlled by these same agents.

This paper deals only with the bacteriological tests and the sensitivity reactions as related to the problem of dental caries.

MATERIALS AND METHODS

Description of Population • The study was conducted among the first 320 male enlistees who arrived for basic training after March 1, 1951. These men represented all the states east of the Mississippi River Valley, the majority coming from the northeastern quarter of the United States. Their ages ranged from 17 to 25 with an average age of 18½ years. The men enlisted in their home area, then they were transferred to Great Lakes in groups of 5 to 20 men.

Immediately on arrival, each recruit submitted a saliva specimen and received either procaine penicillin, aureomycin or a placebo. The antibiotic agents or placebo were administered in order of strict rotation. Within the next 48 hours, the men received a complete dental and medical examination and started a series of prophylactic immunizations. Then they were formed into four companies and each company was assigned to a single large dormitory in an "H" type barracks. The three groups received the routine dental care provided for recruits.

After assignment to a company, a man's movements were integrated into the activities of his respective unit. During the first five weeks of training, except for brief periods of evening recreation, there was practically no contact between companies. Company schedules for meals, classes, drills and rest periods were carried out independently and apart.[1] Con-

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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1. Jarrett, E. T.; Zelle, M. R., and Hollaender, A. Studies of the control of acute respiratory disease among naval recruits. Limitations of ultraviolet irradiation in reducing air-borne bacteria in barracks with low ceilings. Am. J. Hyg. 48:223 (Sept.) 1948.

tacts with training personnel were brief and casual and were limited largely to relationship of instructor and student. During the sixth week, companies were assigned to service week and had prolonged daytime contact with permanent personnel of the recruit training command. In addition, the recruits were permitted to visit nearby cities one afternoon per week during the last two weeks of training. Other prolonged contacts were those occurring in the regimental dispensary and Navy hospital. Men hospitalized over three days were dropped from the study.

Preparations Used • The following agents were used in the study:

A—Capsule containing a placebo.
B—Capsule containing 100,000 units of procaine penicillin.
C—Capsule containing 250 mg. of aureomycin.

In order to eliminate bias, the preparations used were unpacked on receipt and labeled with code numbers A, B and C by the officer in charge of the Medical Research Unit No. 4. The code was not disclosed to the dental investigators until all the results had been compiled.

The first man entering the study received A, the second B, the third C, and the fourth A, and so on; this method of assignment of the capsules was strictly adhered to for the 320 men. The first 80 men who received the capsules by this method comprised the first company. The other three companies were formed in a like manner. Therefore, there were about equal numbers in the three treatment groups A, B and C in each company. Subsequently each man received one capsule of the same preparation daily (prior to breakfast) during the first six weeks of training after which all treatment was discontinued but the observations were continued throughout the remaining period of training.

Technic of Administration • A special treatment roster, in alphabetical order, was made up for each man in the treatment group. A space was provided for checking off each day's dose. The treatment groups were subdivided in the dormitory into the three groups and lined up in order A, B and C. Each man was issued a cup of water. All men in Group A then filed by and were handed an A capsule and watched until it was swallowed. After the completion of this process with the A group, the B group was given capsules, followed by the C group. The Naval Medical Research Unit No. 4 was in charge of administering all capsules and all procedures were supervised by a chief hospital corpsman of that unit.

Plan of Study • Lactobacillus counts were made according to the Hadley method[2] from the saliva which had been collected from the recruits immediately on arrival. Since the men arrived at all hours of the day and night, the specimens had not been collected under the most ideal conditions. In order, however, to make one count before the initial administration of the agents, this procedure was necessary. Thereafter, lactobacillus counts were made weekly from saliva specimens collected when the individuals arose and prior to the administration of the agents.

Beginning with the dental examination, and continuing weekly thereafter, the condition of the gingival tissue was recorded for each man. The gingival tissue was assessed according to a modified method outlined by Schour and Massler,[3] Massler, Schour and Chopra,[4]

2. Hadley, F. P. A quantitative method for estimating Bacillus acidophilous in saliva. J.D. Res. 13:415 (Oct.) 1933.

3. Schour, I., and Massler, M. Prevalence of gingivitis in young adults. (Abst.) J.D. Res. 27:733 (Dec.) 1948.

4. Massler, M.; Schour, I., and Chopra, B. Occurrence of gingivitis in suburban Chicago school children. J. Periodont. 21:146 (July) 1950.

Table 1 • Weekly lactobacillus counts in groups of Navy personnel receiving antibiotic agents orally

Groups	Initial values	Treatment period						Nontreatment period			
		First week	Second week	Third week	Fourth week	Fifth week	Sixth week	Seventh week	Eighth week	Ninth week	Tenth week
Group 1. Placebo											
No. of men	104	98	86	31	93	91	92	95	92	86	82
Mean	112,600	71,000	87,000	88,000	144,000	106,600	95,500	96,900	105,300	164,000	66,300
Median	22 000	32,500	20,000	15,000	36,500	37,500	23,000	30,500	32,000	70,000	12,000
Range (zero to —)	1,600,000	480,000	1,090,000	480,000	1,800,000	1,800,000	1,800,000	720,000	1,400,000	960,000	540,000
Per cent zero counts	10.5	11.2	11.6	6.4	9.6	13.1	11.9	10.5	14.1	6 9	23.1
Per cent counts over 20,000	50.0	64.1	48.8	45.4	60.2	60.4	51.0	55.7	57.6	74.4	41.4
Group 2											
100,000 units procaine penicillin											
No. of men	103	75	97	50	88	83	90	90	79	80	81
Mean	61,000	94,000	65,000	84,000	118,000	66,400	85,500	83,000	81,300	117,200	40,900
Median	23,000	13,000	5,500	33,500	60,000	40,000	31,000	18,000	14,000	36,000	6,700
Range (zero to —)	750,000	1,272,000	850,000	600,000	1,320,000	456,000	560,000	800,000	720,000	720,000	368,000
Per cent zero counts	14.5	12.0	23.6	22.0	18.1	18.0	15.5	17.7	13.9	15.0	19.7
Per cent counts over 20,000	52.4	41.3	39.1	60.0	60.2	63.8	53.3	45.0	43.0	61.2	39.5
Group 3											
250 mg. aureomycin											
No. of men	105	95	98	50	98	88	91	92	90	89	89
Mean	100,000	115,000	99,000	107,000	174,000	119,700	127,100	150,800	119,800	148,200	71,800
Median	30,000	20,000	24,500	50,500	85,000	54,000	77,500	60,000	48,000	87,000	17,500
Range (zero to —)	1,200,000	1,680,000	800,000	600,000	1,800,000	800,000	1,200,000	960,000	900,000	900,000	600,000
Per cent zero counts	12.3	13.6	14.2	16.0	11.2	13.6	8.7	12.9	14.4	10.1	13.4
Per cent counts over 20,000	54.2	49.4	52.0	62.0	76.5	69.3	70.3	68.4	57.7	62.9	48.3

Note: Lactobacillus counts were made for ten weeks but the gingival examinations (Table 2) were made for only nine weeks.

Table 2 • Weekly gingivitis experience (average number of papillary gingival units affected) in groups of Navy personnel receiving antibiotic agents orally

Groups	Initial values	Treatment period						Nontreatment period		
		First week	Second week	Third week	Fourth week	Fifth week	Sixth week	Seventh week	Eighth week	Ninth week
Group 1. Placebo										
No. of men	107	107	105	104	102	103	99	100	97	98
Mean gingivitis	4.3	2.7	2.4	2.6	2.8	3.0	2.7	3.0	2.3	2.0
Per cent ginvigitis free	28	48	49	47	40	39	45	41	49	52
Group 2 100,000 units procaine penicillin										
No. of men	107	104	103	103	100	99	95	93	92	91
Mean gingivitis	4.1	2.5	1.9	2.5	2.3	2.1	2.1	2.5	2.0	1.8
Per cent gingivitis free	36	38	46	43	49	53	44.1	41.9	52	52
Group 3 250 mg. aureomycin										
No. of men	106	106	104	104	100	99	101	99	95	96
Mean gingivitis	3.3	1.6	1.8	2.1	1.9	1.7	1.9	1.6	1.6	1.5
Per cent gingivitis free	40	56	46	51	51	58.5	54	50.5	63	60

Mean gingivitis = Average number of papillary gingival units affected by inflammation per man.
Per cent gingivitis free = Per cent of men in the group with no gingivitis.

and Massler and Savara.[5] The modification consisted of using only papillary gingival tissue in determining the degree of gingivitis for each man. The results were tabulated as the number of papillary gingival areas affected in each mouth.

RESULTS

The daily ingestion of 100,000 units of procaine penicillin or 250 mg. of aureomycin failed to reduce or control the lactobacillus counts. When these agents were withdrawn, the counts remained relatively unchanged. In the group receiving the placebos, the lactobacillus counts closely paralleled those of the treatment groups for the period of the study (Table 1).

There was no evidence that these antibiotic agents produced any sensitivity reactions in the gingival tissues during the treatment period nor was there any evidence that the gingivitis was reduced.

DISCUSSION

The results presented indicate that neither the procaine penicillin nor the aureomycin effected any appreciable alteration in lactobacillus counts. The greatest reduction in lactobacilli occurred in the placebo group but in none of the groups was the change considered significant.

During the third week of the study, 50 to 70 per cent of the lactobacillus cultures were grossly contaminated by a mold resembling the common genus aspergillus. This contamination occurred in the three groups and was presumably due to an error in the laboratory technic rather than to a change in the composition of the saliva or the oral flora.

The condition of the papillary gingival tissue of the recruits on their arrival indicated that their oral hygiene procedures had been neglected. This was reflected in the low percentage of recruits who had no gingivitis at the time of their original dental examination. The mean number of gingival units affected supports this supposition. Beginning with the first weekly survey, the percentage of recruits who were free from gingivitis

5. Massler, M., and Savara, B. S. Relation of gingivitis to dental caries and malocclusion in children 14 to 17 years of age. J. Periodont. 22:87 (April) 1951.

increased for each group and remained fairly constant throughout the period of study. The mean number of papillary gingival units originally affected decreased and thereafter varied only slightly (Table 2). If the procaine penicillin or the aureomycin had produced sensitivity reactions in the gingival tissues, it would have been reflected by a decrease in number of recruits who were free from gingivitis or by a sharp increase in the mean values.

An interesting observation was that three recruits entering the study had Vincent's infection. By chance, one recruit fell into each of the treatment groups. The survey at the end of the first week indicated that the infection had subsided in the recruit in the procaine penicillin treatment group. The recruit in the aureomycin group did not exhibit the infection at the second week survey while the recruit in the placebo group did not have the infection at the third week survey. One of the recruits in the placebo group developed Vincent's infection prior to the first week survey but it disappeared prior to the third survey. In each of the four cases, the Vincent's symptoms subsided spontaneously without oral treatment, and gingivitis was present in each recruit throughout the remaining period of the study.

CONCLUSIONS

Two antibiotic agents, procaine penicillin and aureomycin, and a placebo, were administered to 320 male Navy recruits during the period of March 1 to April 18. Neither of the antibiotic agents demonstrated any ability to reduce or control the lactobacillus counts in the population. There was no evidence to indicate that the antibiotic agents produced any oral sensitivity reactions or produced any important alteration in the gingivitis rates of the recruits.

Books Eternal • The world of books is the most remarkable creation of man. Nothing else that he builds ever lasts. Monuments fall, nations perish, civilizations grow old and die out; and, after an era of darkness, new races build others. But in the world of books are volumes that have seen this happen again and again, and yet live on, still young, still as fresh as the day they were written, still telling men's hearts of the hearts of men centuries dead. *Clarence Day, Jr.*

The role of the pulpless tooth in systemic disease: a summary

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In the June, 1951, issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, a comprehensive report[1] to the Council on Dental Health was published. Three years were devoted to a careful search and appraisal of professional literature, in consultation with ten highly informed specialists. The report was an attempt to provide a critical estimation of that which is known fact regarding the role of the pulpless tooth in systemic disease.

The original theory that the pulpless tooth was a source of focal infection developed in the early 1900's. This was many years prior to the technical achievements which are now taken for granted in bacteriologic and diagnostic technics and in endodontic treatment. It was decided, therefore, that this hypothesis should be examined most critically. It was decided, further, that this examination should be made (1) from the standpoint of current roentgenographic, anatomic, bacteriologic and endodontic considerations; (2) from the standpoint of the scientific evidence available to link a pulpless tooth and its periapical tissues with five groups of common diseases (joint, heart, renal, ocular and skin diseases), and (3) from the standpoint of the impact on the profession's understanding of the nature of collagen diseases which has come from recent research in pituitary-adrenal reactions. This report, however, did not include the summarizing conclusions which research now seems to permit one to draw. These conclusions will be presented, but, first, 11 background considerations will be outlined which a critical approach demands for a thoroughly scientific appraisal of this one area of accumulated information—a controversial area of diagnosis and practice.

BACKGROUND CONSIDERATIONS IN APPRAISAL OF INFORMATION

The following 11 considerations, which the diagnostician should keep in mind, were the basis on which the scientific literature was assayed.

1. In order to achieve a clear-cut appraisal of the etiologic significance of any infection, a distinction must be made between focal infection and a focus of infection because systemic infection may or may not result from a focus. Appleton[2] has stated this difference most concisely: "Any localized infection is potentially a focus of infection" but "The development

Presented before the Combined Section Meeting, ninety-third annual session of the American Dental Association, St. Louis, September 10, 1952.

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1. Easlick, K. A., and others. An evaluation of the effect of dental foci of infection on health. J.A.D.A. 42:609 (June) 1951.

2. Appleton, J. L. T. Bacterial infection with special reference to dental practice, ed. 3. Philadelphia, Lea & Febiger, 1944, p. 391.

of secondary lesions traceable to the primary focus constitutes focal infection."

2. A variety of organisms constitute the typical oral flora and the normal mucous membrane tolerates them. In degenerated pulp tissue of root canals, relatively few oral organisms survive. Routinely, anhemolytic (gamma) and viridans (alpha) types of streptococci predominate, and hemolytic types (beta) are relatively rare[3-6] in cultures secured aseptically from root canals.

3. Research, reported as recently as 1948[3] and confirmed again in 1950,[6] indicates that roughly 40 per cent of pulpless teeth diagnosed roentgenographically as involved by definite periapical pathology may be expected to be found sterile when cultured *in situ* by aseptic technics. Any study, hence, which assumes that a root canal and its periapical tissues are infected because of roentgenographic evidence of periapical pathology alone, has to be discarded in one's search for valid evidence of an oral focus of infection.

4. Current endodontic technics and posttreatment surveys have shown that roentgenographic evidence of the reestablishment of three structures—normal lamina dura, periodontal membrane and periapical bone—removes a treated tooth from suspicion as a focus of infection.[7-11]

5. Again, because of the routine presence of oral bacteria in the saliva, the gingival crevices and periodontal pockets of patients and the pumping of these resident bacteria into the pulp chambers of teeth during extractions,[12-14] and because of the contamination of extracted teeth as they are drawn through the saliva of these areas, all studies based on the presence of bacteria in the pulps or on the root ends of extracted teeth also will have to be discarded as evidence of the presence of an oral focus of infection.

6. Further, an infected lesion of any tissue is determined histologically by the changes which the bacteria produce; it cannot be determined by the presence of transient bacteria alone. Bacteria may be transported by the blood stream but infection cannot, since infection results from the reaction between pathogenic bacteria and tissue.[15-23]

7. It now is realized, in spite of the evident adaptation of some bacteria to a specific environment, that the validity of the theory of elective localization of bacteria has not been demonstrated.[23]

3. Ostrander, F. D., and Crowley, Mary C. The effectiveness of clinical treatment of pulp-involved teeth as determined by bacteriologic methods. J. Endodontia 3:6 (Jan.) 1948.

4. Hayes, R. L. Clinical and bacteriological study of 340 pulp therapy cases. J. D. Res. 22:301 (Aug.) 1943.

5. Morse, F. W., Jr., and Yates, M. F. Follow-up studies of root-filled teeth in relation to bacteriologic findings. J.A.D.A. 28:956 (June) 1941.

6. Bender, I. B., and Seltzer, Samuel. The use of penicillin-streptomycin in the treatment of infected pulpless teeth. Oral Surg., Oral Med. & Oral Path. 3:1070 (Aug.) 1950.

7. Coolidge, E. D. The reaction of cementum in the presence of injury and infection. J.A.D.A. 18:499 (March) 1931.

8. Moen, O. H. Tissue changes in treated teeth of known history. J.A.D.A. 15:2075 (Nov.) 1928.

9. Hatton, E. H. Histologic studies of living tissue reactions associated with pulpless teeth that may be taken as evidence of a satisfactory or physiologic healing. J.A.D.A. 18:1502 (Aug.) 1931.

10. Blayney, J. R. Present conception of vital reactions which occur within apical tissues after pulp removal. J.A.D.A. 16:851 (May) 1929.

11. Sommer, R. F. Pathologic conditions arising from pulp involved teeth. J.D. Soc. N.Y. 10:3 (March-April) 1944.

12. Tunnicliff, Ruth, and Hammond, Carolyn. Presence of bacteria in the pulps of intact teeth. J.A.D.A. & D. Cosmos 24:1663 (Oct.) 1937.

13. Burket, L. W., and Burn, C. G. Bacteremias following dental extraction. Demonstration of source of bacteria by means of a nonpathogen (Serratia marcescens). J.D. Res. 16:521 (Dec.) 1937.

14. Kanner, Oscar. How may bacteria enter the pulps of intact teeth? J.D. Res. 17:47 (Feb.) 1938.

15. Grove, C. J. The present status of pulpless teeth and improved root canal technique. D. Items Interest 49:493 (July) 1927.

16. Coolidge, E. D. The status of pulpless teeth as interpreted by tissue tolerance and repair following root canal filling. J.A.D.A. 20:2216 (Dec.) 1933.

17. Dixon, C. M., and Rickert, U. G. Results of experimental root canal therapy. J. Periodont. 8:19 (Jan.) 1937.

18. Burket, L. W. Recent studies relating to periapical infection, including data obtained from human necropsy studies. J.A.D.A. & D. Cosmos 25:260 (Feb.) 1938.

19. Herbert, W. E. Cases treated by root resection. Brit. D.J. 70:173 (March 1) 1941.

20. Frankl, Zoltan. Is apicoectomy of equal value with extraction in the therapy of focal infection? D. Items Interest 70:1183 (Dec.) 1948.

21. Eckes, H. F., and Adams, F. L. Combined root canal therapy and apicoectomy: a progress report. J.A.D.A. 39:66 (July) 1949.

22. Grossman, L. I. Root canal therapy, ed. 3. Philadelphia, Lea & Febiger, 1950, p. 188, 24, 305.

23. Holman, W. L. Focal infection and "elective localization"; a critical review. Arch. Path. & Lab. Med. 5:68 (Jan.) 1928.

8. Because of the contamination of media by the laboratory methods used as late as the early 1930's,[24] and because of the lack of extensive use of oral roentgenography prior to 1925,[22] Grossman[22] has pointed out:

> It is a disconcerting but true statement to make that practically every investigation dealing with the pulpless tooth and made prior to 1936 is invalid in the light of recent studies.

9. Conclusions based on serial developments in patients about which a cause-and-effect relationship casually has been reported, should be guarded against, or at least be considered critically. It is human nature to assume, because a patient was treated with "X" and the patient reacted in the following days, therefore, the patient's reaction was due to the treatment by "X." But, was it? Hospitalized patients may get considerable bed rest, they may get specific medication, physical therapy, dietary therapy, heat therapy, the extraction of a tooth and some other surgical interference. The patient feels better. Human nature is such that each specialist claims credit for the recovery. Scientific dentists, it must be repeated, have to guard against reports which use the reasoning of *post hoc, ergo propter hoc*.[25]

10. Before assessing the role of the pulpless tooth in joint disease, it is essential that the diagnostician be familiar with the current classification of joint disease[26] as reported by the American Rheumatism Association. Furthermore, a differential knowledge seems equally essential to determine those joint diseases which can be induced by specific bacterial invasions of a joint, by allergic responses in joints to bacterial invasions of the body and by conditions totally nonbacterial in nature which involve joints. Those distinctions must be clear-cut when one attempts either to appraise available information or suggest treatment for diseased joints.

In addition to the actual involvements of joints, the last "Primer on the Rheumatic Diseases,"[27] prepared by a committee of the American Rheumatism Association, lists 13 types of nonarticular disease, the thirteenth of which is "psychogenic rheumatism," rheumatic manifestations of psychoneurosis.

11. Research workers have not established completely the agent or agents that "trigger" the biologic alarm reactions, so well described by Hans Selye.[28] These alarm reactions appear to be responsible for the collagen diseases that are manifested by conspicuous changes in the collagen of connective tissue. Some of the collagen diseases are (*a*) rheumatic fever, for which there is excellent presumptive evidence of sensitization by the hemolytic streptococci, Lancefield type A, organisms infrequently isolated from root canals;[20, 29-32] (*b*) rheumatoid arthritis, whose etiologic agent, in spite of extensive study, still is unknown; (*c*) periarteritis nodosa, which recently has been demonstrated can be provoked as an anaphylactic type of hypersensitivity to foreign serum,[29] particularly horse serum; (*d*) disseminated lupus erythematosus for which there is, as yet, no etiologic clue

24. Dawson, M. H.; Olmstead, M., and Boots, R. H. Bacteriologic investigations on the blood, synovial fluid and subcutaneous nodules in rheumatoid (chronic infectious) arthritis. Arch. Int. Med. 49:173 (Feb.) 1932.

25. Reimann, H. A., and Havens, W. P. Focal infection and systemic disease: a critical appraisal. J.A.M.A. 114:1 (Jan. 6) 1940.

26. Hench, P. S., and others. Rheumatism and arthritis: review of American and English literature of recent years (ninth rheumatism review). Part I. Ann. Int. Med. 28:66 (Jan.) 1948; Part II. 28:309 (Feb.) 1948.

27. American Rheumatism Association Committee. Primer on rheumatic diseases. J.A.M.A. 139:1268 (April 30) 1949.

28. Selye, Hans. The general adaptation syndrome and the diseases of adaptation. J. Clin. Endocrinol. 6:117 (Feb.) 1946.

29. Rich, A. R., and Gregory, J. E. Experimental evidence that lesions with basic characteristics of rheumatic carditis can result from anaphylactic hypersensitivity. Bull. Johns Hopkins Hosp. 73:239 (Oct.) 1943.

30. McKeown, E. F. Experimental serum carditis and its relationship to rheumatic fever. J. Path. & Bact. 59:547 (Oct.) 1947.

31. MacIlwaine, Yvonne. The relationship between rheumatic carditis and subacute bacterial endocarditis. J. Path. & Bact. 59:557 (Oct.) 1947.

32. Denny, F. W., and others. Prevention of rheumatic fever: treatment of the preceding streptococcic infection. J.A.M.A. 143:151 (May 13) 1950.

33. Baehr, George, and Levitt, M. F. The diseases of collagen. Veterans Admin. Tech. Bul., May 31, 1951, p. 1.

from the bacteriologists;[32] (*e*) scleroderma, etiology unknown,[33] and (*f*) dermatomyositis, etiology entirely obscure.[33]

Each of this bizarre group of conditions has, at times, been attributed to focal infection and cures by the removal of foci have been mistakenly announced.

CONSIDERATIONS IN TREATMENT

With this background for the scientific appraisal of the pertinent information regarding oral foci of infection or oral focal infection, three conclusions regarding treatment appear in order:

1. Dentists must remain concerned about a demonstrated infection in the mouth or any part of the body because of the possibility of local extension of such an infection, or the invasion of the blood stream to the extent that the host's numerous defensive mechanisms are overwhelmed.

2. Dentists appear to have sufficient information to warrant particular concern about oral surgical intervention or the presence of oral foci in the mouths of patients with valvular heart disease. *Streptococcus viridans,* common residents of the oral cavity and pulpless teeth, most frequently are associated with subacute bacterial endocarditis[34-37] and adequate evidence has been presented over a period of years of the occurrence of transient bacteremias after surgery of the mouth.[38-42]

3. The evidence is extremely poor in support of an etiologic relationship between oral foci and joint disease, heart disease (other than in those patients with valvular damage or congenital heart lesions), renal disease, ocular disease and skin diseases. Dentists should continue to eradicate oral foci, then, as a therapeutic measure, not as a curative measure.

ESSENTIAL RESEARCH

At this point in the critical appraisal of information two essential research problems suggest themselves. Until these fundamental researches are completed the health professions still will be groping for answers.

Essential Steps • In the determination of scientific fact regarding the role of oral focal infection in human disease, it would appear that dentists, physicians and other health workers eventually must complete the following five essential steps in a long-range, sequential program of research:

1. An accurate scientific diagnosis should be made of the body disease for which oral foci are under suspicion as etiologic contributors.

2. An accurate determination should be made of the specific strain of bacteria or its toxin (if it produces one) or its reactive products with the host's tissues, whichever is involved.

3. It must be established that this specific organism is found in the host's pulpless tooth.

4. It must be established further that there is a mechanism whereby this organism or the products of its interaction with

34. Kelson, S. R., and White, P. D. Notes on 250 cases of subacute bacterial (streptococcal) endocarditis studied and treated between 1927 and 1939. Ann. Int. Med. 22:40 (Jan.) 1945.

35. White, P. D.; Matthews, M. W., and Evans, Elwyn. Notes on the treatment of subacute bacterial endocarditis encountered in 88 cases at the Massachusetts General Hospital during the six-year period 1939 to 1944 (inclusive). Ann. Int. Med. 22:61 (Jan.) 1945.

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pulpal tissues can gain entrance to the blood stream.

5. Finally, this organism or its products should be recovered from the blood stream and, whenever feasible, from the diseased part.

Alarm Reaction • A further research challenge is presented by the initial knowledge now available of the human biologic alarm reaction and the current tools of research to be found in the adreno-corticosteroids. The challenge is as follows:

1. The precise role of sensitization of human tissue in human disease should be ascertained.

2. Then it should be determined whether hyperallergic responses of human tissue are the significant etiologic factors in all of the collagen diseases for which oral foci so frequently have been under suspicion.

3. The specific agents—bacterial or nonbacterial—which precipitate such responses should be designated scientifically.

SUMMARY

It would appear that the final scientific appraisal by the modern dentist of the role of oral foci in human disease demands a critical approach to available information, some routine procedures of treatment which critically appraised information will endorse, and the earnest prosecution of two particularly fruitful areas of research.

Written Learning • Books are faithful repositories, which may be awhile neglected or forgotten, but when they are opened again, will again impart their instruction. Memory, once interrupted, is not to be recalled; written learning is a fixed luminary, which, after the cloud that had hidden it has passed, is again bright in its proper station. Tradition is but a meteor, which, if it once falls, cannot be rekindled. *Johnson.*

Silicate cement: method of mixing in a closed container to prevent effects of exposure to atmosphere

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Silicate cement liquids, being essentially aqueous solutions of phosphoric acid, are hygroscopic. Consequently, when exposed to air, the liquids take on or give off water, depending on the amount of moisture present in the air. This gain or loss of water, which greatly affects the setting time of the cement, occurs principally when the cement liquid is exposed to air during withdrawal of liquid from the bottle, while the liquid rests on the glass slab prior to mixing, and during mixing of the powder and liquid. The cement liquid should therefore not be exposed to air if ideal conditions are to prevail in mixing silicate cements. Also, the temperature of the glass slab on which the cement mix is prepared markedly affects the amount of powder that can be incorporated in a given quantity of liquid to produce a workable plastic mix. If the slab is cold, a high powder:liquid ratio can be obtained and the cement will be stronger and less soluble and will have less shrinkage than if a warm slab is used. Unfortunately, however, water will condense on the slab when it is chilled much below room temperature during hot and humid weather.

It was the purpose of this investigation to devise a system which would eliminate exposure of the silicate cement liquid to the air during storage or mixing and would permit cement to be chilled and kept moisture free during mixing, independent of air temperature and humidity. If such a procedure were practicable, then restorations of silicate cement with high compressive strength, low solubility and small shrinkage during setting could be made repeatedly, regardless of weather conditions.

METHODS OF MIXING

Several methods of mixing silicate cement in a sealed container, at the same time maintaining a high powder:liquid ratio, were investigated. The most satisfactory method developed consisted of mixing the cement in a sealed flexible container held under cold water. Thin-walled, uncolored, paddle-shaped rubber balloons (Fig. 1, A) were used as the mixing containers. A measured amount of powder sufficient for the large majority

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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of restorations was inserted with the aid of a glass funnel into a washed and dried balloon. The balloon was cut off approximately one inch from the bottom, and the bottom portion containing the silicate powder was sealed with rubber cement (Fig. 1, B).

It was found that better mixes were obtained if most of the air was extracted from the container after sealing in the powder. This was done routinely with a 24 gauge needle and syringe (Fig. 1, C).

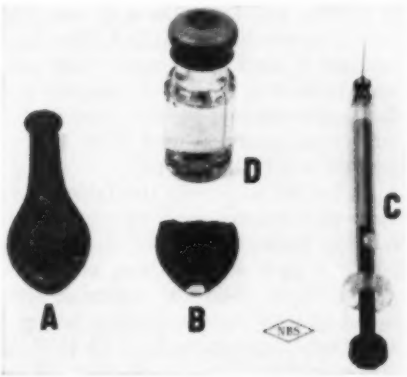

Fig. 1 • Equipment for mixing silicate cement in a sealed, flexible container. A: Paddle-shaped rubber balloon. B: Sealed bottom section of balloon containing silicate cement powder. C: Tuberculin type syringe with 24 gauge needle. D: Silicate cement liquid in serum bottle with self-sealing rubber stopper

In order to eliminate any possible seepage of air or water into the balloon during storage or mixing, a patch of balloon material was cemented over the point of insertion of the needle.

The liquid was easily protected from air by storing it in a small serum bottle with a self-sealing rubber stopper (Fig. 1, D) through which a needle could be repeatedly inserted and the liquid withdrawn as needed (Fig. 2) for injection into the powder container (Fig. 3). The liquid was injected into the balloon

Fig. 2 • Extraction of silicate cement liquid from serum bottle through self-sealing rubber stopper via needle and syringe

through the double-wall thickness in the area of patch which provided a self seal. Mixing was begun immediately after injection of the liquid. The powder and liquid were kneaded rapidly between the fingers and thumb of both hands for one minute, under water (Fig. 4).

Some attempts were made to simplify the method by sealing the liquid and powder in separate compartments of the mixing container in such a way that the liquid could be forced into the powder at the time of mixing, but it was found that the rubber balloons and rubber cement used for sealing were attacked by the silicate cement liquid at common storage temperatures. It is probable that

Fig. 3 • Injection of silicate cement liquid into sealed balloon containing weighed amount of powder through area of double thickness of balloon wall

Fig. 4 • Mixing silicate cement powder and liquid in sealed balloon under water

a method of packaging eliminating the separate bottle of liquid could be developed by further work.

PROPERTIES OF CEMENT MIXED IN SEALED CONTAINERS

Powder:Liquid Ratio • The standard testing consistency of the cement used in this investigation, determined according to A.D.A. Specification No. 9, was 1.65 Gm. of powder to 0.4 ml. of liquid. The manufacturer's recommended consistency was 1.45 Gm. per 0.4 ml.

At a normal room temperature of 21° C. (70° F.) and a relative humidity of 65 ± 10 per cent, mixes at a consistency of 1.7 Gm. per 0.4 ml. were made in sealed containers in water at 21° C. with no difficulty, and a consistency of 1.9 Gm. per 0.4 ml. was possible. It was impossible to incorporate 1.9 Gm. of powder in 0.4 ml. of liquid on a slab even though it was cooled.

At a room temperature of 32° C. (90° F.) and a relative humidity of 90 per cent it was impossible to incorporate 1.7 Gm. of powder in 0.4 ml. of liquid on a slab cooled to just above the dew point, 30.5° C. (87° F.). By mixing in the rubber container, a ratio of 1.7 Gm. to 0.4 ml. was obtained in water at 20° C. (68° F.) with no difficulty even though the room temperature was 32° C. (90° F.).

Setting Time • In the table are shown the times of setting of a silicate cement mixed in a sealed container in water at four different temperatures (15° C. [59° F.], 20° C. [68° F.], 25° C. [77° F.] and 30° C. [86° F.]) and tested at 21° C. (70° F.) and 32° C. (90° F.). Specimens used in these tests were mixed at a ratio of 1.7 Gm. to 0.4 ml. The tests were conducted as specified in A.D.A. Specification No. 9, with the exception that mixing was done in the sealed container and that a mix one-half the size prescribed in the specification was used (0.85 Gm. of powder to 0.2 ml. of liquid).

As can be seen from the table, specimens mixed under water at temperatures ranging from 15° to 30° C. (59° to 86° F.) gave setting times of 3¾ to 2¾ minutes when the materials were stored and the specimens were prepared at a room temperature of 21° C. (70° F.) and a relative humidity of 65 ± 10 per cent, and setting times of 2½ to 1¾ minutes when stored and prepared at a temperature of 32° C. (90° F.) and a relative humidity of 90 ± 10 per cent. All mixes made under water at 20° C. (68° F.) or less allowed ample time for proper insertion in the average restora-

Table • Setting time of a silicate cement mixed under water in sealed containers

Temperature of water		Setting time*	
		21° C. (70° F.) Humidity 65 ± 10%	32° C. (90° F.) Humidity 90 ± 10%
°C.	°F.	minutes	minutes
15	59	3¾	2½
20	68	3½	2½
25	77	3½	2¼
30	86	2¾	1¾

*Setting time given is average of three mixes recorded to nearest 15 seconds from start of mix. Mix consisted of 0.85 Gm. of powder to 0.2 ml. of liquid.

tion even though the atmospheric temperature and humidity were high.

Mixes were also made under water at 10° C. (50° F.) and 35° C. (95° F.). Water at 10° C. (50° F.) was found to be too cold for the hands. Mixes made under water at 35° C. (95° F.) set in the rubber bag during mixing.

CONCLUSIONS

The influence of atmospheric conditions on the mixing of silicate cements can be eliminated by mixing in a closed container. Thus a comparatively large amount of powder can be incorporated in a given quantity of liquid to produce a usable consistency of cement under extreme temperature and humidity conditions. Consequently, satisfactory silicate cement restorations can be made under all climatic conditions. This has not been possible heretofore with the conventional method of mixing of the cement on a glass slab.

Selective control of roentgenographic contrast with radiopaque media

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Roentgenograms are shadow pictures produced by the differential absorption of the roentgen-ray beam traversing the tissues and structures under investigation. Tooth structures can be visualized best on roentgenograms when their images exhibit high definition and adequate contrast. Roentgenographic definition is a function of the geometric factors of the equipment and technic employed, whereas contrast is usually a function of voltage, exposure, choice of film and developer, developing time and the control of fogging from secondary radiation by various means. A new method for the selective control of contrast will be described in this article.

Details on roentgenograms can be detected with certainty when they exhibit a minimum contrast or difference in film blackening of 0.02 density units[1] from adjacent structures or the background. When conventional roentgenographic procedures are employed, roentgenographic contrast decreases with increased tube voltage because the effective wave length of the roentgen-ray beam is decreased and the radiation then is stopped more uniformly by all tissues and structures. The employment of filters in the roentgen-ray beam is a second method which decreases the effective wave length of the beam and hence decreases contrast. Contrast can be varied through choice of developer and film and by the use of fluorescent or intensifying screens with the film in a cassette. Increasing the exposure can increase contrast because the densities involved would then

Presented before the Section on Roentgenology combined with the Section on Pedodontics and Oral Hygiene, ninety-second annual session of the American Dental Association, Washington, D. C., October 17, 1951.

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Fig. 1 • Left: Roentgenogram of dried mandibular molar produced with sufficient exposure to portray lingual cusps and root apexes to good advantage. Right: Roentgenogram of same tooth produced with adequate exposure to depict clearly internal structure of tooth's crown

be functions of a steeper portion of the characteristic curve of the film emulsion and conditions employed. Contrast increases with developing time up to a certain optimum point beyond which the contrast decreases again because of chemical fogging of the film. Improvement in the contrast of intraoral roentgenograms by the use of grids to reduce fogging by secondary radiation has not been practical. Reducing the fogging of the film from secondary radiation by reducing the area of irradiation on the patient's face with cones or diaphragms has been proved to be a valuable method for improving film contrast.

Figure 1, left, was produced by making a roentgenogram of a dried mandibular molar lying on a film packet. Sufficient exposure was given to portray the lingual cusps and root apexes to good advantage. The contrast between the dentin and enamel, however, is very low and details within the crown of the tooth are lacking. A second roentgenogram (Fig. 1, right) was produced under similar conditions but with adequate exposure given to depict clearly the internal structure of the tooth's crown, including the pulp chamber, carious and secondary dentin. Improved contrast between the dentin and enamel resulted from the prolonged exposure; but the lingual cusps, the root apexes and the outer edges of the tooth can be discerned partially or not at all simply because these structures are too dark to be seen. Other test roentgenograms, produced with intermediate exposures, also failed to portray adequately all parts of the tooth; therefore, it appears that there is no single exposure capable of recording all portions of the tooth to best advantage with conventional procedures. Resorting to higher voltages is only a partial solution to the problem of portraying the entire tooth advantageously because always accompanying the higher tube voltage is the usually undesirable decrease in contrast. In the roentgenogram produced with prolonged exposure, the lingual cusps, root apexes and the outer edges of the tooth are lost because these structures are thin compared with the rest of the tooth and appear dark on the film. Fogging from secondary radiation adds additional density to the images of these structures with the result that the contrast between these structures and the background is too small for them to be discerned in the roentgenogram.

EFFECT OF IMMERSION OF A TOOTH IN A RADIOPAQUE MEDIUM

A horizontal section of a generalized tooth is depicted schematically in Figure 2A. The horizontal section represented in the drawing is through the tooth's crown although the following explanation could apply also to a horizontal section through the root of a tooth with its root canal in the center. In this illustration, the roentgen rays are directed downward through the tooth and onto the film below. The paths of two individual rays are of special interest; the first ray passes through the enamel, dentin and enamel again and the second ray

through air, enamel and air again before reaching the film. Air offers little additional resistance to the passage of Ray 2 compared with that which it encounters in traversing the continuous wall of enamel. Even though Ray 1 does not pass through as much enamel as does Ray 2, it passes also through some dentin which is less radiopaque than enamel. The intensities of the two rays upon reaching the film are quite similar; therefore, little contrast is produced in the roentgenogram. If some homogeneous substance of greater radiopacity than air were substituted for the air surrounding the lower half of the tooth (Fig. 2B), the difference in intensity between the two rays would be increased because of the additional radiopacity placed in the path of Ray 2 with a subsequent improvement in contrast in the roentgenogram. The series shown in Figure 3, left, illustrates how variations in depth of the radiopaque medium replacing the air around the tooth affect the character of the roentgenographic image. In the upper left illustration, the depth of the radiopaque medium in which the tooth is situated is 25 per cent of the buccolingual thickness of the tooth's crown; little difference in the appearance of the tooth is noted as compared with the tooth in Figure 1, right, where the tooth was surrounded solely by air. As the depth of the radiopaque medium increases, the lingual cusps, root apexes, periphery of the tooth and the internal details of the tooth's crown all become clearly discernible; and the contrast between the dentin and enamel increases up to a certain depth of immersion, beyond which the contrast decreases. The variation in dentin-enamel contrast as a function of depth of radiopaque medium surrounding the tooth is graphically shown in Figure 3, right, where it is noted that maximum contrast is achieved when the tooth is 100 per cent immersed. Further increase in depth of the radiopaque medium places additional radiopacity in the path of Ray 1 as well as in the path of Ray 2 and no further advantage is realized. The exposures for this illustration were adjusted to keep the roentgenographic density of the dentin fairly constant in each instance. In addition to increasing the contrast of the roentgenogram, the immersion of the tooth in a homogeneous radiopaque medium has effectively smoothed out variations in the thickness of the various parts of the tooth and has reduced considerably the amount of secondary radiation which fogs the image of the tooth.

EFFECT OF RADIOPACITY OF THE IMMERSING MEDIUM ON ROENTGENOGRAPHIC CONTRAST

Various homogeneous radiopaque media are available for work of this type. Carbon tetrachloride (CCl_4) was the first radiopaque medium tested; but it was discarded because of its toxicity, volatility, excellent solvent action and the fact that its radiopacity could be decreased by dilution but never increased. Sodium iodide (NaI) solutions finally were chosen as the radiopaque media used in this investigation.

The radiopacity of a sodium iodide solution varies with its concentration. The upper left roentgenogram in Figure 4 was taken in air with sufficient exposure given to cause the internal details

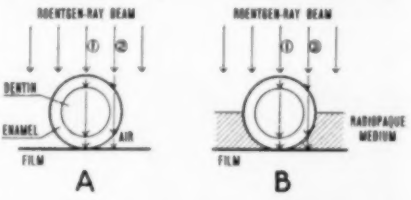

Fig. 2 • A: Horizontal section of generalized tooth immersed in air. B: Horizontal section of same tooth partially immersed in radiopaque medium

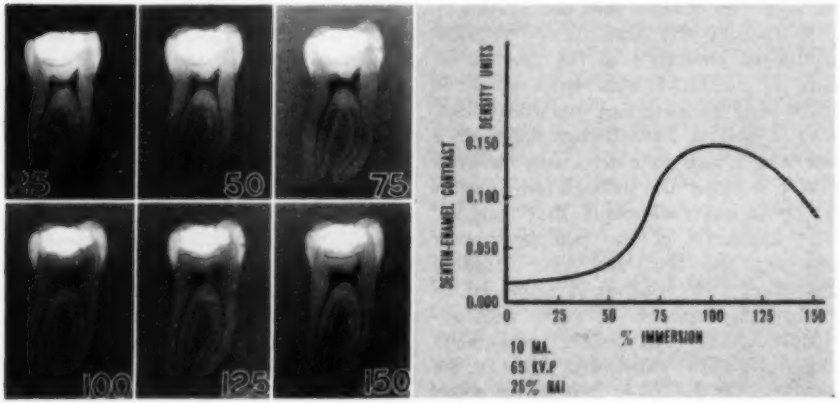

Fig. 3 • Left: Series of roentgenograms demonstrating how variations in depth of radiopaque medium replacing air around tooth affect character of roentgenographic image. Right: Dentin-enamel contrast measured on roentgenograms of Figure 3, left, plotted against depth of radiopaque medium surrounding tooth. Depth of radiopaque medium expressed in percentages of buccolingual diameter of tooth's crown

of the crown to show clearly whereas the lingual cusps, root apexes and the periphery of the tooth have been lost almost entirely. The adjacent roentgenogram of the same tooth was exposed identically but with the tooth entirely immersed in a 20 per cent sodium iodide solution (20 Gm. of sodium iodide dissolved in 100 Gm. of water). It is of interest to note that the background has been lightened considerably though it is still darker than the dentin of the roots. The lingual cusps, root apexes, periphery of the tooth and internal details of both the crown and roots are clearly visible. When a 30 per cent sodium iodide solution is used, the background lightens further but is still slightly darker than the root dentin. With the sodium iodide concentration increased to 35 per cent, the root dentin and background become almost similar in color on the roentgenogram, the dentin of the roots is no longer visible and only the root canals still show. A 40 per cent sodium iodide concentration further lightens the background so that the root dentin shows once again but now darker than the background. Now the relation between the densities of the root dentin and the background has been reversed. By further increasing the percentage of sodium iodide in the solution, a concentration can be found which produces a background of identical color with the enamel. With an 85 per cent solution,

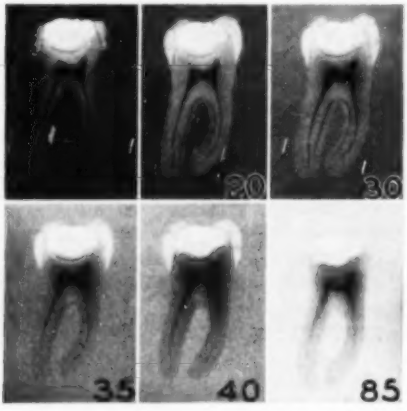

Fig. 4 • Series of roentgenograms illustrating effect of radiopacity of immersing medium on contrast

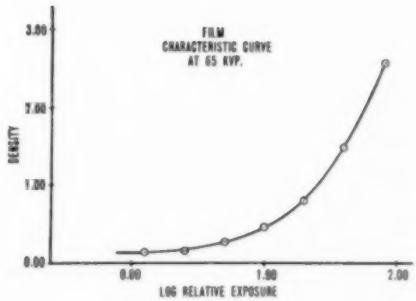

Fig. 5 • Film characteristic curve derived for emulsion and conditions employed in this investigation

the enamel of the tooth is no longer discernible in the roentgenogram but just the restoration, carious and secondary dentin, dentin and pulp. It is curious to note that the incipient cavity in the enamel on the mesial surface of this tooth still shows in the last illustration even though the enamel containing the cavity does not. To prevent the radiopaque solutions from entering the tooth, all openings such as foramens and cavities were carefully sealed with wax. Pellets of cotton, completely immersed in the radiopaque medium, were useful in supporting the teeth in any desired position. The cotton, being very radiolucent, does not show in the roentgenogram.

The characteristic curve for the emulsion and conditions used in this investigation is presented in Figure 5. Experimental data regarding the effect of sodium iodide concentration on dentin-enamel contrast are contained in Table 1. The exposures for this series of tests were adjusted to keep the roentgenographic density of the dentin fairly constant as shown in Table 1. Figure 6 is derived from the data included in Table 1 and indicates that a linear relation exists between dentin-enamel contrast and the logarithm of the sodium iodide concentration over a range from 15 to 85 per cent.

EFFECT OF TOOTH-FILM DISTANCE ON ROENTGENOGRAPHIC CONTRAST

The series shown in Figure 7 demonstrates how increasing the tooth-film distance affects the character of the roentgenographic image. The image enlargement increased and the definition decreased as the tooth-film distance was increased. The tooth was completely immersed in a sodium iodide solution throughout these experiments, and the tooth-film distance was successively varied from zero to 20 mm. The voltage, current, exposure and source-film distance were held constant at all times. The roentgenographic densities of the background, dentin and enamel and the dentin-enamel contrast are listed in Table 2A and plotted in Figure 8A. An identical series of tests was then repeated but with the roentgen-ray beam columnated by a lead diaphragm located in the plane of the tooth and containing an aperture the shape of the tooth to eliminate the effect of secondary radiation. The results of these tests are listed in Table 2B and are plotted in Figure 8B.

It is interesting to note that the background density decreased in Figure 8A as the object-film distance was increased but remained almost constant in Figure 8B. The diminution of the background

Table 1 • Effect of sodium iodide concentration on dentin-enamel contrast

Sodium iodide concentration %	Dentin density	Enamel density	Dentin-enamel contrast
15	0.860	0.790	0.070
25	0.930	0.670	0.260
35	0.840	0.545	0.295
45	0.870	0.495	0.375
55	0.845	0.410	0.435
65	0.840	0.380	0.460
75	0.835	0.330	0.505
85	0.885	0.320	0.565

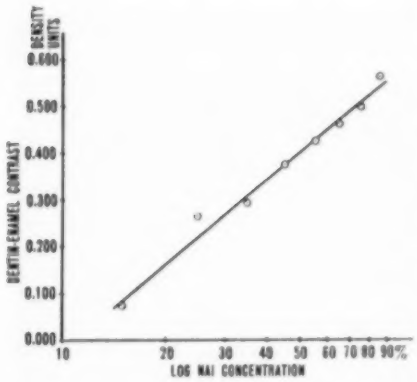

Fig. 6 • Dentin-enamel contrast plotted against logarithm of sodium iodide concentration. Data taken from Table 1

density in the former case is reasonable because when the film is zero mm. from the tooth, all the scattered radiation emanating from the bottom of the container which held the sodium iodide solution and the tooth must reach the film and produce the resultant fogging

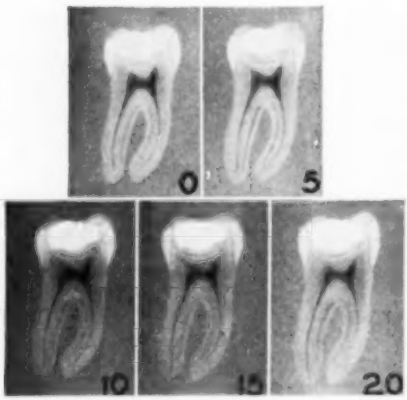

Fig. 7 • Series of roentgenograms demonstrating how variations in tooth-film distance affect character of roentgenographic images

from secondary radiation. As the distance between the tooth and film is increased, less of the scattered radiation reaches the film and more escapes in other directions. The intensity of the scattered radiation also decreases as the distance to the film increases. In Figure 8B the background remained constant at the level of the density of the film base.

With the background cut off, the density of the dentin decreased with increased tooth-film distance as illustrated in Figure 8B. This decrease may be due to the diminishing effectiveness of the scattered radiation originating in the tooth itself and in the small amount of sodium iodide solution located within the aperture. The contribution of the scattered radiation from the background became manifest in the increased density of the dentin at zero distance in Figure 8A. The density of the dentin in Figure 8A increased with increased tooth-film distance as the image of the tooth became more accessible to the scattered radiation from all sources and not only from those which were immediately adjacent to the tooth. After the density of the dentin reached a maximum, it decreased slowly with further increase of tooth-film distance as less of the scattered radiation reached the film and more escaped in other directions. The intensity of the scattered radiation also decreased as the distance to the film increased. Similar reasoning can explain also the variations in the density of the enamel shown in Figures 8A and 8B. By subtracting the density of the enamel from that of the dentin, the dentin-enamel contrast was obtained. These results are plotted in Figures 8A and 8B. It is interesting to note that contrast decreased with increased tooth-film distance when there was no scattered radiation contributed by the background; but contrast increased, reached a maximum and then decreased when the background contributed some scattered radiation to the image of the tooth.

EFFECT OF VOLTAGE ON ROENTGENOGRAPHIC CONTRAST

The variation of dentin-enamel contrast as a function of voltage was investigated. The series shown in Figure 9, above, covers the usual range of 40 to 70 peak kilovolts encountered in dental roentgenography. At the higher voltages, the background has recorded lighter than the root dentin on the roentgenograms. With 55 to 60 peak kilovolts, the root dentin and background are almost similar in film blackening; and at the lower voltages, the background has registered darker than the root dentin in the roentgenograms. In this series the tooth was completely immersed in a 35 per cent sodium iodide solution. The inversion in color just noted between the root dentin and background did not occur when a 25 per cent sodium iodide solution was used as the immersion medium.

Roentgenographic contrast usually is considered to vary inversely with the tube voltage. Quite different results were obtained, however, when the tooth was entirely immersed in a 25 per cent sodium iodide solution; the dentin-enamel contrast was found to increase with the voltage up to a maximum point reached near 55 peak kilovolts, followed then by a decrease in contrast (lower curve of Figure 9, below). On a series of roentgenograms produced with the 35 per cent sodium iodide solution, densitometer measurements indicated that the dentin-enamel contrast increased with the voltage up to a maximum point near 60 peak kilovolts, followed then by a decrease in contrast (upper curve of Figure 9, below). The results of the tests from which Figure 9, below, was plotted are contained in Table 3.

The phenomenon of the roentgenographic contrast increasing to a maximum with increasing tube voltage is most interesting. It is possible that the voltage at which the maximum contrast occurs increases with the radiopacity of the immersing medium.

Table 2A • Effect of object-film distance on density and contrast

	Object-film distance				
	0 mm.	5 mm.	10 mm.	15 mm.	20 mm.
Background density	1.630	1.640	1.530	1.400	1.355
	1.625	1.570	1.500	1.455	1.335
	1.630	1.620	1.500	1.375	1.350
Dentin density	1.130	1.260	1.215	1.095	1.015
	1.120	1.175	1.160	1.145	1.030
	1.135	1.220	1.195	1.080	1.030
Enamel density	0.850	0.905	0.845	0.790	0.745
	0.855	0.835	0.830	0.795	0.740
	0.840	0.890	0.840	0.775	0.735
Dentin-enamel contrast	0.280	0.355	0.370	0.305	0.270
	0.265	0.340	0.330	0.350	0.290
	0.295	0.330	0.355	0.305	0.295

Table 2B • Effect of object-film distance on density and contrast (background shielded)

	Object-film distance				
	0 mm.	5 mm.	10 mm.	15 mm.	20 mm.
Background density	0.330	0.330	0.360	0.340	0.365
	0.335	0.335	0.340	0.360	0.370
	0.345	0.335	0.350	0.355	0.360
Dentin density	0.995	0.905	0.865	0.795	0.805
	0.990	0.855	0.810	0.825	0.835
	1.025	0.845	0.840	0.820	0.810
Enamel density	0.570	0.540	0.530	0.490	0.505
	0.560	0.510	0.490	0.500	0.515
	0.605	0.515	0.525	0.505	0.505
Dentin-enamel contrast	0.425	0.365	0.335	0.305	0.300
	0.430	0.345	0.320	0.325	0.320
	0.420	0.330	0.315	0.315	0.305

APPLICATIONS OF NEW TECHNIC

The new technic described in this paper can be applied advantageously in making roentgenograms of extracted teeth. The method can be used as a research tool, for the production of superior roentgenograms of extracted teeth for publication purposes and as a means for teaching the dental student the relationship between the internal and external morphology of teeth.

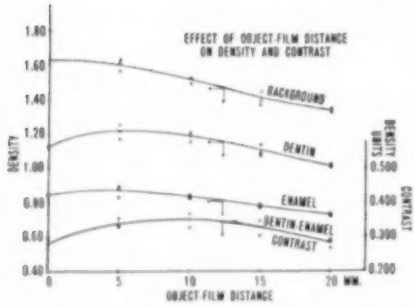

Fig. 8 • A: Roentgenographic densities of background, dentin and enamel and dentin-enamel contrast plotted against object-film distance. Data taken from Table 2A

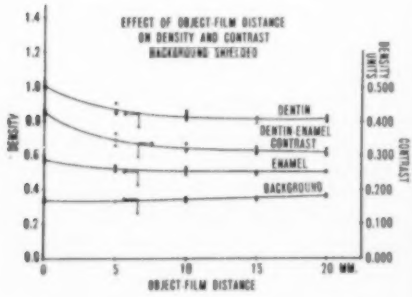

Fig. 8 • B: Roentgenographic densities of background, dentin and enamel and dentin-enamel contrast plotted against object-film distance. Data taken from Table 2B. Background was shielded by lead diaphragm located in plane of tooth and containing an aperture the shape of the tooth to eliminate effect of secondary radiation

The upper rows of illustrations in Figure 10 portray various types of teeth with roentgenograms made in the conventional manner. The lower rows of illustrations depict the same teeth with roentgenograms taken when the teeth were totally immersed in a 25 per cent solution of sodium iodide. In each instance the improvement in the visualization of the dentoenamel junction and the pulp chamber in its entirety is considerable. The two teeth in the lower part of Figure 10 had just been extracted and still had some soft tissue attached. With the new technic the soft tissue is clearly visible at the apex and neck of the tooth but does not appear in the roentgenograms produced in the conventional manner. The two roentgenograms in the left hand column of Figure 11 show two aspects of a tooth exhibiting dens in dente. The center and right hand columns illustrate the differences produced by employing different radiopaque media.

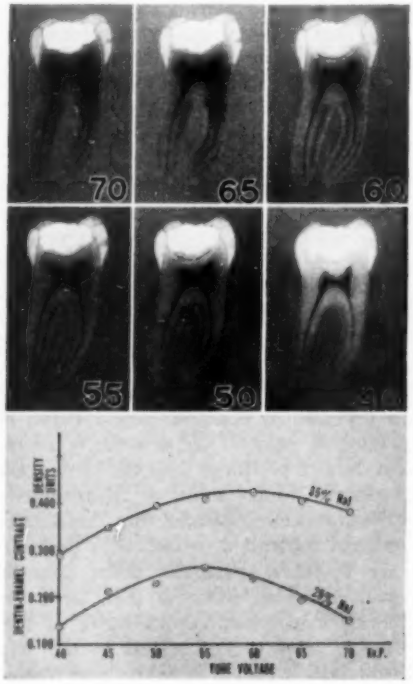

Fig. 9 • Above: Series of roentgenograms demonstrating how variations in tube voltage affect character of roentgenographic images. Below: Dentin-enamel contrast plotted against voltage for tooth entirely immersed in 25 and 35 per cent sodium iodide solutions. Data taken from Table 3

The detection of carious areas in a tooth is not improved by this form of roentgenography in those instances in which the radiopaque medium enters and fills the cavity because the radiopaque medium partially or entirely decreases the contrast between adjacent sound tooth structure and the carious area. Sealed carious dentin or areas involving an opening in the enamel too minute to allow the radiopaque medium to penetrate the tooth can be depicted advantageously with this technic.

If this method were to be applied to teeth in the mouth, the radiopaque medium would have to be in the form of a nontoxic paste which could be spread around the teeth. The buccal and lingual surfaces of the mass of radiopaque paste enveloping the teeth would have to be reasonably smooth and parallel. A paste made of suitable amounts of barium sulfate and calcium carbonate or of sodium iodide and some substance like

Table 3 • Effect of variation in tube voltage on dentin-enamel contrast

Sodium iodide concentration %	Kilovoltage peak	Dentin density	Enamel density	Dentin-enamel contrast
25	40	0.970	0.830	0.140
25	45	0.975	0.760	0.215
25	50	0.950	0.720	0.230
25	55	0.980	0.715	0.265
25	60	0.960	0.720	0.240
25	65	0.945	0.750	0.195
25	70	0.960	0.810	0.150
35	40	0.955	0.665	0.290
35	45	0.960	0.610	0.350
35	50	0.970	0.575	0.395
35	55	0.955	0.545	0.410
35	60	0.975	0.550	0.425
35	65	0.950	0.545	0.405
35	70	0.960	0.580	0.380

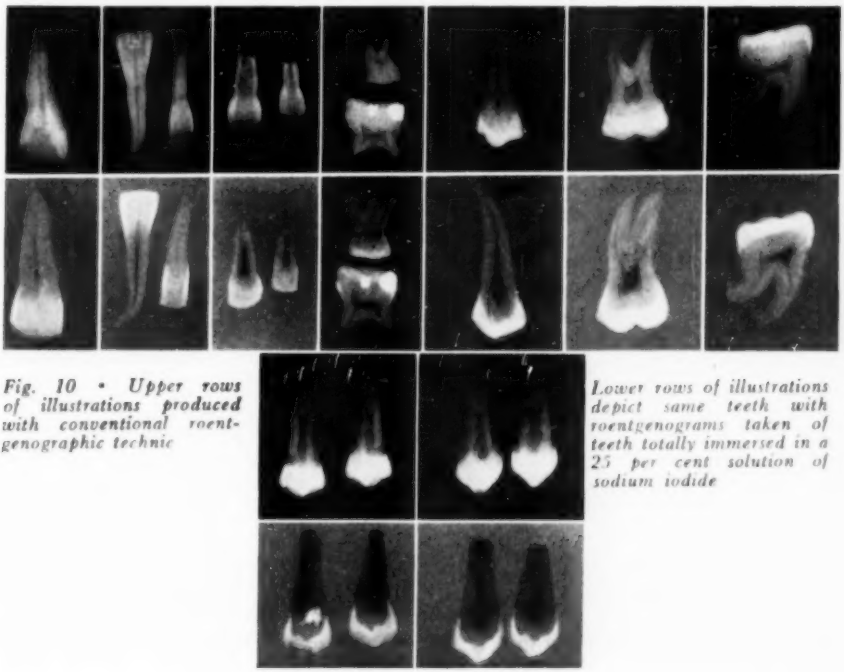

Fig. 10 • Upper rows of illustrations produced with conventional roentgenographic technic. Lower rows of illustrations depict same teeth with roentgenograms taken of teeth totally immersed in a 25 per cent solution of sodium iodide.

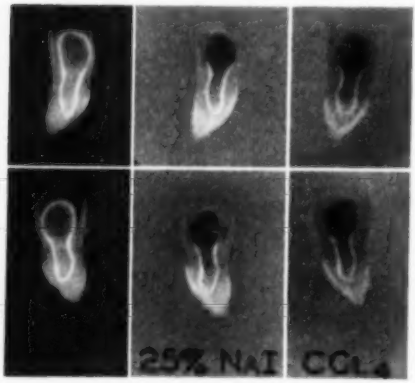

Fig. 11 • Roentgenograms in left column portray two aspects of tooth exhibiting dens in dente. In center and right columns tooth is immersed in sodium iodide and carbon tetrachloride respectively

bentonite could be used in the mouth. Since the radiopaque medium must surround the tooth, the new technic is not applicable for use in the mouth. The root and neck of the tooth already are buried in the alveolar bone, and the interdental spaces normally are filled with gingival papillae so that no room is left for the application of the radiopaque medium.

SUMMARY

The new roentgenographic technic just described improves the visualization of tooth structures. Substituting a radiopaque medium for the air surrounding the tooth improves dentin-enamel contrast, reduces fogging from secondary radiation and permits even the thinnest portions of the tooth to register clearly on the roentgenogram while details within the crown of the tooth also are clearly visible. Depth of the radiopaque medium surrounding the tooth, radiopacity of the medium, tube voltage and tooth-film distance are all factors which affect roentgenographic contrast. Anatomic limitations restrict the use of this technic to extracted teeth. This new process is useful as a research tool, to produce superior roentgenograms of extracted teeth for publication purposes and as a teaching aid in dental schools.

American Life • American life is a powerful solvent. It seems to neutralize every intellectual element, however tough and alien it may be, and to fuse it in the native good will, complacency, thoughtlessness, and optimism. *George Santayana, "Character and Opinion in the United States."*

Effectiveness of vacuum investing in the elimination of surface defects in gold castings

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The presence of small "bubbles" or nodules on gold castings constitutes one of the most common defects encountered in the casting of dental golds. Such defects are caused by air bubbles mixed into the investment or trapped on the surface of the wax pattern while it is being invested.

In 1947 Phillips[1] reported that casting defects due to the presence of air bubbles in the investment could be eliminated routinely by a technic in which the filled casting ring was subjected to a vacuum and then to atmospheric pressure immediately after the pattern was invested. He also stated that castings free of surface defects could be produced by a careful and standardized technic not involving the use of a vacuum.

Recently several manufacturers have placed on the market vacuum investors designed to eliminate nodules from the surface of the casting by making it possible to perform both the spatulating and investing processes under a vacuum of approximately 27 to 29 inches of mercury. It was the object of this investigation to determine the effectiveness of these investors in producing smooth castings free of surface defects. No attempt was made to determine the effect of the investors on other properties of castings. Nor was any attempt made to compare the relative merits of the investors other than their effectiveness in eliminating surface defects.

METHODS

One hundred gold castings were made from patterns invested using vacuum investors. Another 100 castings were made from patterns invested in air at atmospheric pressure in the usual manner. All wax patterns were prepared on MOD stainless steel dies. Seventy-five castings from each group were made by the thermal expansion technic; 25 were made by the hygroscopic expansion technic. All castings were pickled in a 50 per cent sulfuric acid solution and were examined for defects under a binocular microscope.

The atmospheric pressure method used was intended to duplicate the average work of a skilled operator. The invest-

The opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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1. Phillips, R. W. Relative merits of vacuum investing of small castings as compared to conventional methods. J. D. Res. 26:343 (Oct.) 1947.

ment was mixed in a mechanical spatulator and carefully painted on the pattern with a soft camel's-hair brush. To keep the amount of air in the mix to a minimum the investment powder was slowly sifted into the water in the spatulator bowl, the powder particles were then moistened by hand spatulation, the mix was vibrated to remove air bubbles and the investment was mixed with the mechanical spatulator.

In preparing the vacuum-invested castings the investors listed in the table were used, following the manufacturers' directions.

The technic consisted essentially of the following. The water and powder in the mixing bowl were placed under a vacuum until the water began to boil. The investment was then spatulated in the vacuum. Next the investment, still under vacuum, was poured into the casting ring containing the wax pattern. During this operation the ring was vibrated to cause the investment to flow freely around the pattern. After the ring had been filled, the vacuum source was disconnected, and inrushing air collapsed any air or water vapor bubbles remaining in the investment.

In making preliminary castings by the vacuum investing technic it was observed that porous castings occurred more often than when the usual investment methods were used. This porosity was prevented in subsequent castings by modifying the technic to provide better mold ventilation. A large spherical reservoir was placed on the sprue and the pattern was so located in the ring that it was covered by not more than approximately ¼ inch of investment at the bottom of the ring.

Table • Investors used in preparing vacuum-invested castings

Investor	Manufacturer
Barr Vacuum Investor	General Refineries, Inc. Minneapolis, Minn.
Dee Motorized Vacuum Investing Unit	Handy and Harman Chicago, Ill.
Vac-U-Spat	Whip-Mix Corporation Louisville, Ky.

RESULTS

Of the 100 castings made by the atmospheric pressure method 17 were completely free of nodules. All of the castings had relatively smooth surfaces except for these defects.

Ninety-five of the 100 vacuum-invested castings were free of casting defects. The presence of nodules on the five remaining castings was apparently due to the position of the pattern in the ring. All of the nodules which occurred were the result of bubbles trapped under horizontal or concave surfaces on the pattern.

There was no apparent difference in surface smoothness between the two groups of castings free of defects. Also, there was no distinguishable difference in surface smoothness between the castings made by the hygroscopic technic and those made by the thermal expansion technic.

The three vacuum investors used produced similar results. No one of the three showed evidence of superiority in the production of smooth nodule-free castings.

To observe the effectiveness of the vacuum investors in removing air from the investment, samples of mixes made in air and of mixes made in the investors were pressed between glass plates and back lighted to reveal air bubbles. The results indicated that while the vacuum investors did not eliminate all bubbles, the number of bubbles was greatly reduced.

CONCLUSIONS

The vacuum investing technics used in this investigation produced a much higher percentage of nodule-free castings than did the atmospheric pressure technic used.

COUNCIL ON DENTAL THERAPEUTICS

Gordon-Moore's Ruby Red Tooth Paste
An informative report

This report is issued in response to the large number of inquiries that have been received concerning Gordon-Moore's Ruby Red Tooth Paste. Inasmuch as no therapeutic claims are made for the dentifrice, the Council on Dental Therapeutics will not classify it, and this report is merely a presentation of some of the available information concerning the product.

A preliminary examination in the Council's chemical laboratory suggests that the product is a conventional type of dentifrice, employing calcium carbonate as the principal abrasive agent, to which a water-soluble red dye has been added. A sample mixed with distilled water was observed to have a pH of 8.0 at 25°C. The product responds satisfactorily when subjected to the glass scratch test as applied in the Council's laboratory for the detection of harsh abrasives.

The examination did not provide any evidence to support the claims that the product cleans the teeth "as no other toothpaste can"; that it "polishes teeth in a similar way that jewellers' rouge polishes gold"; that it is effective in "preserving teeth and thus helping to prevent decay"; that it will make the teeth "shades and shades whiter" or that it is significantly superior to other conventional cleansing dentifrices.

The statement that the product is "ammoniated" was not borne out by analysis in the Council's chemical laboratory; ammonium compounds were not detected in significant quantities, and use of the Kjeldahl procedure revealed the presence of only minimal amounts of nitrogen from any source.

In response to an inquiry from the Council office, the manufacturer stated that Gordon-Moore's Ruby Red Tooth Paste is made from materials of finer texture than those usually found in toothpaste, and that the dye is pure carmine. The firm freely admits that its product is no more useful than other dentifrices, which are merely adjuncts to oral hygiene procedures. The firm further asserts that the use of carmine dye is an added feature which will induce more people to brush their teeth.

The Council has no additional information concerning the safety or cleansing qualities of the product. Reports have been received which confirm the manufacturer's claim that the red dye in the dentifrice will cause some staining of the oral mucosa. It may also discolor some restorations, especially about the margins. It has been suggested that a material which stains the oral tissues in this fashion should not be employed because of the harm that may ensue as a result of the possible masking of gingival disorders for which the patient would otherwise seek professional treatment.

It is the opinion of the Council on

Dental Therapeutics that the advertising claims for this toothpaste and for many other dentifrices are exaggerated and misleading. The firms marketing some dentifrices apparently resort to these forms of "puffery" in their efforts to compete successfully in a field crowded with articles whose questionable values are misrepresented daily in advertising.

The Council deplores the current distorted claims in dentifrice advertising, and urges the profession to maintain its skeptical attitude toward all dentifrice advertising which implies that such products have a demonstrated usefulness beyond their ability to assist the toothbrush in cleansing the accessible surfaces of the teeth.

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Survey of needs for dental care
II. Dental needs according to age and sex of patients

Almost all types of dental need vary considerably with the age of the patient. Tables 10 and 11 show the dental needs of 37,911 white patients in five-year age groups. Two types of figures are given: percentage of patients needing the specified dental service, and average need for all patients in each age category. Average need is given in number of teeth, with the following exceptions: number of one-surface and more-than-one-surface fillings, and number of space maintainers.

Separate figures are given for patients under 15 and 15 years of age and over. This will permit comparisons between this survey and the *Study of Dental Needs of Adults*, made by the Association in 1940, which included only patients 15 and over. It will also help in comparing the results of this survey with the many studies which have been made on school children.

FILLINGS

The average number of teeth needing fillings was highest in the 15 to 19 age group for both males (5.62) and females (4.86). Above that age there was a gradual tapering off, but not until patients reached their sixties did they average less than one tooth needing filling (Fig. 4). Despite the fact that the average patient over 60 was missing over half of his teeth, about a third of these patients had teeth needing fillings.

Considering all age groups, about five out of every 100 teeth needing fillings needed more than one filling. Almost no patients over 45 had any teeth requiring more than one filling. The ratio of num-

The first article of this series, entitled "Methodology and Composition of Sample," appeared in The Journal, December 1952, p. 706.

Table 10 • Dental needs of 15,672 white males, by age

Age	Teeth needing fillings		Fillings				Extractions needed because of													
			One surface		More than one surface		Decay		Impaction		Periodontal disease		Prosthetic restoration		Tooth fracture		Other reasons		All reasons	
	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.
-4	71.4	3.05	55.1	1.65	40.1	1.40	11.8	.30	.0	.00	.0	.00	.0	.00	1.0	.01	1.0	.01	13.9	.32
5-9	79.1	3.38	58.3	1.90	53.6	1.73	27.4	.74	.5	.05	.1	. . .	.1	. .	.4	.01	4.0	.07	31.4	.87
10-14	78.5	3.90	69.2	2.83	47.7	1.40	21.2	.51	1.2	.05	.4	. . .	.1	. .	1.7	.01	6.0	.06	28.0	.63
15-19	83.6	5.62	72.1	3.29	64.4	2.76	26.9	.80	4.1	.09	.9	.03	1.5	.11	1.1	.01	2.6	.06	32.8	1.10
20-24	77.8	4.27	61.2	2.15	60.6	2.24	29.4	.89	9.8	.19	2.4	.20	2.4	.09	.4	. .	3.6	.06	40.8	1.43
25-29	76.3	3.71	58.2	1.90	60.6	1.95	25.2	.77	8.2	.18	4.6	.32	2.8	.16	1.1	.02	5.8	.08	39.0	1.53
30-34	71.4	3.16	53.2	1.68	54.7	1.64	21.6	.72	5.3	.12	7.3	.62	3.0	.12	.8	.01	3.3	.06	33.4	1.65
35-39	64.4	2.52	45.8	1.36	46.6	1.26	18.6	.56	3.9	.08	12.2	1.11	3.7	.21	1.1	.02	3.0	.06	34.2	2.04
40-44	55.9	2.09	39.6	1.13	39.9	1.02	16.8	.65	2.7	.06	15.0	1.23	5.0	.28	1.0	.01	2.7	.06	34.0	2.29
45-49	54.6	1.71	33.2	.89	35.8	.82	17.4	.53	1.8	.04	17.0	1.50	3.8	.20	.3	. .	3.3	.11	36.3	2.38
50-54	45.7	1.35	30.7	.80	26.0	.55	14.7	.64	1.4	.02	18.6	1.40	5.5	.31	.7	.01	2.3	.09	34.9	2.47
55-59	36.6	1.04	23.6	.58	20.9	.46	15.7	.60	.8	.01	22.3	1.88	7.8	.39	1.5	.02	2.8	.13	40.0	3.03
60-64	31.0	.76	18.6	.40	19.8	.36	15.7	.64	1.3	.02	25.3	1.99	5.9	.36	1.3	.02	2.5	.12	38.6	3.15
65-69	31.8	.88	20.0	.56	17.0	.32	12.5	.43	1.2	.02	19.8	1.65	6.0	.31	1.8	.03	3.3	.21	35.4	2.65
70-	23.9	.52	13.8	.29	13.5	.23	15.3	.65	.9	.03	19.9	1.37	9.0	.67	1.9	.02	2.1	.09	38.9	2.83
Total	65.4	3.00	49.3	1.69	45.8	1.42	21.0	.66	3.4	.08	8.1	.65	3.1	.17	.9	.01	3.5	.09	34.1	1.66
Under age 15	78.1	3.61	63.3	2.33	49.6	1.54	23.0	.59	.8	.05	.2	. . .	.1	. .	.6	.01	4.7	.11	28.2	.76
Age 15 and over	62.0	2.83	45.7	1.52	44.9	1.40	20.5	.68	4.1	.09	11.2	.92	3.9	.22	1.0	.01	3.1	.08	35.9	2.00

Note: "%" means the percentage of cases needing the specified dental service. "Avg." means the average need (in number of teeth except for "Fillings") among all cases, including those with no need. To obtain the approximate average need among those cases needing a particular dental service, divide the average by the percentage and move the decimal point of the quotient two places to the right.

Table 10 • Dental needs of 15,672 white males, by age—Continued

Age	Crowns		Fixed bridges						Removable bridges						Partial dentures				Complete dentures		
			First		Second		Third		First		Second		Third		First		Second		Lower only	Upper only	Upper & lower
	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	%	%
-4	1.6	.02	.3	..	.0	.00	.0	.00	.3	..	.0	.00	.0	.00	.3	.02	.3	.02	.0	.3	.3
5-9	1.5	.03	.2	..	.1	..	.0	.00	.1	..	.0	.00	.0	.00	.4	.02	.2	.01	.0	.1	.1
10-14	3.3	.06	5.5	.07	1.9	.02	.5	..	1.0	.01	.3	..	.1	..	1.9	.06	.5	.01	.0	.1	.1
15-19	5.0	.08	18.6	.23	7.8	.09	2.2	.03	4.8	.09	1.3	.02	.2	.01	7.0	.30	2.0	.09	.1	1.0	1.0
20-24	5.6	.09	22.1	.30	9.9	.13	1.8	.02	5.5	12	1.2	.02	.4	.01	12.4	.53	3.2	.13	.4	2.1	2.2
25-29	5.8	.12	22.7	.30	8.9	.12	2.3	.03	6.6	.15	2.0	.04	.5	.02	13.7	.60	4.4	.19	.2	2.0	2.7
30-34	6.5	.12	24.0	.34	8.9	.14	2.5	.03	6.8	.17	1.8	.04	.3	.01	15.3	.69	5.2	.24	.5	2.9	5.9
35-39	5.7	.09	22.3	.31	8.1	.12	2.0	.03	6.0	.15	1.4	.03	.2	..	16.8	.79	6.2	.29	.5	4.1	8.7
40-44	7.1	.16	19.4	.28	7.7	.11	2.4	.04	5.4	.15	1.6	.05	.2	..	16.7	.83	6.1	.30	1.6	5.1	12.3
45-49	7.4	.15	18.3	.29	7.3	.11	1.6	.02	7.5	.25	1.5	.09	.1	..	18.1	.85	5.6	.27	1.6	6.0	12.4
50-54	5.9	.11	11.2	.18	4.2	.07	1.4	.02	6.6	.25	2.2	.06	.3	.01	19.2	1.02	7.5	.39	1.8	6.9	16.9
55-59	6.5	.15	10.5	.18	4.9	.07	1.7	.02	4.0	.13	1.2	.03	.0	.00	17.6	.91	5.5	.30	2.5	8.3	24.1
60-64	6.6	.11	7.2	.12	1.9	.04	.2	..	4.6	.13	1.9	.04	.4	.01	20.0	1.11	7.2	.38	4.0	7.4	25.3
65-69	5.0	.07	6.8	.13	2.1	.04	.6	.01	4.2	.12	.9	.03	.0	.00	16.8	.95	6.0	.32	5.3	9.2	24.6
70-	7.4	.18	4.0	.06	3.1	.05	.9	.02	4.9	.17	.9	.06	.0	.00	14.8	.83	4.9	.25	4.3	5.8	28.5
Total	5.3	.10	14.9	.21	5.8	.08	1.5	.02	4.6	.12	1.3	.03	.2	..	12.0	.58	4.0	.19	1.0	3.3	8.0
Under age 15	2.4	.04	2.8	.04	1.0	.01	.2	..	.6	.01	.1	..	.1	..	1.1	.04	.4	.01	.0	.1	.1
Age 15 and over	6.1	.12	18.3	.26	7.2	.10	1.9	.03	5.8	.16	1.7	.04	.3	.01	15.0	.72	5.1	.24	1.2	4.2	10.1

Note: "%" is the percentage of cases needing the specified dental service. "Avg." is the average need (in number of teeth) among all cases, including those with no need. To obtain the approximate average need among those cases needing a particular dental service, divide the average by the percentage and move the decimal point of the quotient two places to the right.

Table 10 • Dental needs of 15,672 white males, by age—Continued

Age	Periodontal treatment		Root canal treatment		Pulpotomy		Space maintainers		Correction for mal-occlusion	No dental needs*	Other dental conditions			
											Permanent teeth missing		Perm. teeth previously replaced	
	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	%	%	Avg.	%	Avg.
-4	.3	.02	1.3	.02	4.3	.07	5.3	.07	2.6	12.8	.0	.00	.0	.00
5-9	.3	.01	1.2	.02	3.8	.07	12.3	.21	10.8	9.3	1.6	.02	.2	.01
10-14	.6	.06	2.2	.03	1.0	.01	3.6	.06	21.4	7.4	15.0	.33	.8	.02
15-19	3.0	.45	3.6	.05	.7	.01	.4	.01	9.6	5.5	37.5	1.20	3.0	.10
20-24	5.6	.91	2.9	.03	.3	. .	.2	. .	4.7	7.0	55.7	2.88	10.9	.43
25-29	8.4	1.36	2.3	.03	.2	. .	.1	. .	3.7	8.4	65.8	3.97	17.3	.73
30-34	10.6	1.69	1.8	.02	.3	.01	.0	.00	4.1	8.4	68.0	4.76	20.6	1.24
35-39	10.6	1.47	2.1	.02	.2	. .	.0	.00	2.4	9.3	76.7	6.10	24.9	1.58
40-44	13.1	1.84	1.0	.01	.0	.00	.0	.00	4.0	8.9	78.5	7.50	31.8	2.46
45-49	12.9	1.73	1.9	.02	.4	.02	.0	.00	3.1	7.4	88.5	10.17	36.8	3.39
50-54	12.3	1.35	1.9	.02	.2	. .	.0	.00	2.3	8.3	95.4	13.28	41.5	4.42
55-59	11.4	1.36	2.5	.03	.1	. .	.0	.00	2.4	7.8	91.7	13.53	42.7	5.10
60-64	9.9	1.26	1.7	.02	.2	. .	.0	.00	1.3	9.1	93.3	15.21	50.6	6.80
65-69	10.9	1.26	2.1	.02	.3	.	.0	.00	1.8	7.1	96.6	18.21	46.3	6.33
70-	7.4	.80	1.5	.02	.0	.00	.0	.00	1.5	8.6	88.6	15.66	48.9	7.30
Total	7.5	1.03	2.1	.02	.8	.01	1.7	.03	6.4	8.2	56.0	5.43	19.1	1.70
Under age 15	.4	.04	1.7	.02	2.5	.04	7.5	.13	15.2	8.7	7.8	.17	.5	.02
Age 15 and over	9.5	1.31	2.2	.03	.3	. .	.1	. .	4.0	7.9	72.0	7.16	25.3	2.27

*Other than prophylaxis.

Note: "%" is the percentage of cases needing the specified dental service. "Avg." is the average need (in number of teeth except for "Space maintainers") among all cases, including those with no need. To obtain the approximate average need among those cases needing a particular dental service, divide the average by the percentage and move the decimal point of the quotient two places to the right.

Table 11 • Dental needs of 22,239 white females, by age

Age	Teeth needing fillings		Fillings				Extractions needed because of													
			One surface		More than one surface		Decay		Impaction		Periodontal disease		Prosthetic restoration		Tooth fracture		Other reasons		All reasons	
	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.
-4	75.2	3.17	61.8	2.01	42.9	1.43	10.8	.24	.0	.00	.3	. . .	.3	.04	.3	. .	1.3	.01	12.7	.29
5-9	82.4	3.41	63.8	2.08	52.2	1.59	25.7	.74	.0	.00	.3	.01	.0	.00	.4	.01	4.2	.09	30.1	.85
10-14	79.5	4.18	69.9	2.90	49.1	1.66	19.2	.45	1.2	.02	.2	.01	.2	.01	.1	. .	6.1	.15	26.4	.64
15-19	83.0	4.86	69.8	2.91	61.5	2.45	23.2	.67	4.5	.09	.9	.05	1.1	.04	.3	.01	2.9	.07	29.7	.93
20-24	80.2	4.34	64.5	2.42	62.3	2.19	24.6	.73	10.0	.22	2.4	.12	2.7	.12	.4	. .	4.3	.09	37.6	1.28
25-29	77.4	3.71	61.3	2.10	57.8	1.88	23.6	.71	7.4	.15	4.3	.30	2.4	.11	.6	.01	3.5	.08	34.3	1.36
30-34	72.9	3.16	56.4	1.78	51.9	1.50	20.2	.68	5.0	.08	5.8	.43	3.3	.18	.5	.01	3.4	.08	31.2	1.46
35-39	66.7	2.64	50.4	1.53	44.8	1.20	17.7	.64	2.5	.04	7.8	.62	3.4	.18	.5	.01	2.9	.06	28.3	1.55
40-44	61.7	2.23	45.3	1.31	40.3	.99	15.4	.45	2.1	.03	11.2	.74	5.2	.29	.9	.01	2.2	.04	29.8	1.56
45-49	56.5	1.94	41.6	1.13	35.7	.81	14.6	.54	1.3	.04	15.6	1.21	5.6	.35	.9	.02	2.1	.05	32.2	2.21
50-54	51.2	1.71	36.2	1.06	28.5	.65	13.2	.43	1.6	.03	14.3	1.06	5.2	.25	1.0	.01	1.6	.04	28.0	1.82
55-59	43.2	1.20	31.4	.71	23.3	.49	14.2	.60	.8	.01	16.7	1.06	6.0	.36	1.7	.03	2.6	.06	33.2	2.12
60-64	39.8	1.13	28.1	.72	21.6	.43	12.3	.46	.6	.05	16.3	1.18	4.5	.30	1.6	.03	3.2	.12	29.7	2.14
65-69	33.6	.79	23.1	.49	16.1	.30	8.7	.35	.9	.01	20.8	1.67	5.4	.27	.9	.01	2.9	.05	30.0	2.36
70-	36.9	.94	26.1	.63	17.7	.31	12.6	.37	.6	.01	16.2	.87	3.9	.18	2.6	.04	2.0	.08	29.7	1.55
Total	68.7	3.07	53.7	1.82	46.4	1.42	19.2	.60	3.6	.07	6.9	.49	3.0	.16	.7	.01	3.3	.08	30.7	1.41
Under age 15	80.3	3.77	66.7	2.49	49.9	1.61	21.3	.55	.6	.01	.2	.01	.1	.01	.2	. .	4.9	.11	26.8	.69
Age 15 and over	66.5	2.94	51.3	1.69	45.9	1.39	18.8	.61	4.2	.08	8.3	.59	3.6	.19	.7	.01	3.0	.07	31.6	1.55

Note: "%" means the percentage of cases needing the specified dental service. "Avg." means the average need (in number of teeth except for "Fillings") among all cases, including those with no need. To obtain the approximate average need among those cases needing a particular dental service, divide the average by the percentage and move the decimal point of the quotient two places to the right.

Table 11 • Dental needs of 22,239 white females by age—Continued

Age	Crowns		Fixed bridges						Removable bridges						Partial dentures				Complete dentures		
			First		Second		Third		First		Second		Third		First		Second		Lower only	Upper only	Upper & lower
	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	%	%
-4	1.6	.02	.6	.01	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00	1.0	.04	.0	.00	.0	.0	.3
5-9	1.2	.02	.3	. .	.1	. .	.0	.00	.1	. .	.1	. .	.0	.00	.4	.01	. .	. .	.0	.1	.1
10-14	2.1	.03	6.3	.07	3.1	.03	.7	.01	1.7	.03	.3	. .	.1	. .	2.2	.08	.8	.02	.0	.1	.1
15-19	4.2	.08	17.3	.21	7.4	.09	2.0	.02	4.1	.08	.8	.01	.2	. .	9.2	.34	2.2	.10	.2	1.6	.8
20-24	5.7	.10	22.9	.30	9.0	.12	2.3	.03	6.4	.13	1.7	.03	.3	. .	12.4	.55	3.4	.15	.3	1.8	1.7
25-29	5.1	.10	21.2	.28	7.1	.09	2.0	.03	5.7	.14	1.8	.04	.3	. .	15.5	.68	4.3	.19	.5	2.8	2.8
30-34	5.4	.10	22.5	.30	9.2	.12	2.2	.03	7.1	.18	1.9	.04	.2	. .	15.3	.68	4.4	.20	.8	4.0	3.6
35-39	5.5	.10	19.4	.26	7.9	.11	1.8	.03	7.3	.19	1.5	.04	.2	. .	17.0	.81	5.5	.27	.8	3.9	5.7
40-44	7.2	.15	17.9	.25	7.1	.10	1.8	.02	6.6	.17	1.7	.05	.1	. .	21.7	1.00	7.1	.31	1.5	5.6	6.7
45-49	5.4	.10	15.6	.21	6.0	.08	1.7	.03	7.8	.24	2.4	.08	.1	. .	20.9	1.06	7.8	.37	2.1	5.9	11.7
50-54	5.2	.10	12.8	.21	5.1	.07	1.3	.02	6.9	.22	1.7	.05	.1	. .	19.7	1.04	6.9	.34	3.0	6.7	13.2
55-59	5.0	.07	9.6	.16	3.5	.05	1.0	.01	4.7	.18	1.0	.04	.0	.00	19.9	1.12	7.3	.38	3.5	6.3	17.2
60-64	4.6	.08	7.9	.12	2.9	.04	1.1	.02	4.4	.16	1.4	.05	.0	.00	18.2	1.07	6.2	.33	3.5	9.1	17.8
65-69	2.9	.06	8.1	.16	3.1	.06	1.6	.02	5.1	.14	.9	.05	.4	. .	13.8	.77	3.4	.20	5.6	5.8	25.1
70-	3.9	.05	4.2	.06	.8	.02	.3	.01	4.5	.14	1.1	.03	.0	.00	22.3	1.33	5.3	.28	5.0	8.1	19.2
Total	4.7	.09	15.5	.21	6.0	.08	1.6	.02	5.3	.14	1.4	.03	.2	. .	13.8	.66	4.3	.20	1.1	3.5	5.7
Under age 15	1.7	.03	3.3	.04	1.5	.02	.3	. .	.9	.01	.2	. .	.1	. .	1.3	.05	.4	.01	.0	.1	.1
Age 15 and over	5.3	.10	17.9	.24	7.0	.09	1.8	.02	6.2	.16	1.6	.04	.2	. .	16.3	.78	5.1	.24	1.4	4.2	6.8

Note: "%" is the percentage of cases needing the specified dental service. "Avg." is the average need (in number of teeth) among all cases, including those with no need. To obtain the approximate average need among those cases needing a particular dental service, divide the average by the percentage and move the decimal point of the quotient two places to the right.

Table 11 • Dental needs of 22,239 white females, by age—Continued

Age	Periodontal treatment		Root canal treatment		Pulpotomy		Space maintainers		Correction for mal-occlusion	No dental needs*	Other dental conditions			
											Permanent teeth missing		Perm. teeth previously replaced	
	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	%	%	Avg.	%	Avg.
-4	.3	.06	1.9	.03	4.8	.08	4.1	.07	3.2	13.7	.0	.00	.0	.00
5-9	.1	. . .	1.1	.01	3.5	.05	12.4	.22	13.8	8.1	2.4	.04	.5	.02
10-14	.4	.05	2.4	.03	1.1	.02	3.1	.05	23.6	6.5	17.4	.38	.7	.03
15-19	3.5	.63	3.7	.05	.7	.01	.4	.01	9.2	6.9	37.8	1.26	4.2	.14
20-24	7.3	1.11	3.2	.04	.4	.01	.1	. .	5.4	6.8	52.6	2.08	11.1	.43
25-29	8.6	1.34	2.3	.03	.5	.01	.2	. .	4.0	7.1	58.3	2.66	17.2	.89
30-34	9.4	1.36	2.1	.03	.4	.01	.0	.00	3.5	8.5	65.1	3.75	22.2	1.22
35-39	12.2	1.74	2.3	.03	.4	. .	.0	.00	3.8	8.6	72.8	4.91	30.3	1.77
40-44	12.3	1.67	2.2	.03	.2	. .	.0	.00	3.8	10.0	78.4	6.75	36.5	2.64
45-49	14.4	1.67	.9	.01	.3	.01	.0	.00	3.0	8.2	81.3	7.60	41.3	3.34
50-54	10.4	1.21	1.0	.01	.2	. .	.0	.00	2.6	9.0	80.1	9.06	46.1	4.70
55-59	11.5	1.32	.9	.01	.1	. .	.0	.00	2.3	9.0	87.2	12.28	51.8	5.82
60-64	11.9	1.21	1.7	.02	.3	. .	.0	.00	2.8	10.7	84.1	12.27	53.1	6.79
65-69	8.2	.76	.4	.02	.2	. .	0	.00	.7	9.2	74.1	11.50	53.0	7.93
70-	12.7	1.46	1.1	.01	.3	. .	.0	.00	2.2	8.4	95.2	16.61	51.5	8.33
Total	8.1	1.10	2.1	.03	7	.01	1.2	.02	6.4	8.2	55.0	4.27	21.8	1.79
Under age 15	.2	.03	1.8	.02	2.4	.04	7.1	.12	17.7	7.8	9.5	.20	.6	.02
Age 15 and over	9.7	1.32	2.2	.03	.4	.01	.1	. . .	4.2	8.2	66.0	5.23	26.8	2.20

*Other than **prophylaxis.**

Note: "%" is the percentage of cases needing the specified dental service. "Avg." is the average need (in number of teeth except for "Space maintainers") among all cases, including those with no need. To obtain the approximate average need among those cases needing a particular dental service, divide the average by the percentage and move the decimal point of the quotient two places to the right.

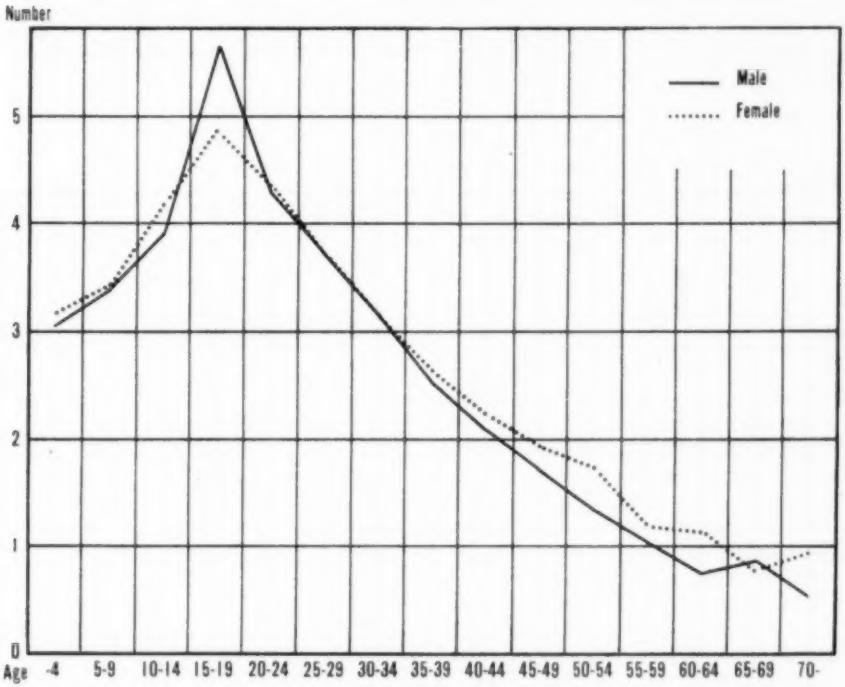


Fig. 4 • Average number of teeth needing fillings, by age and sex

ber of fillings to teeth needing fillings was highest in the 15 to 19 age group.

The figures from this survey do not establish any clear-cut difference with respect to dental decay between male and female patients. On the average, females required a slightly greater number of fillings, but this picture was not consistent among the various age groups. The fact that the average female had seen her dentist at a more recent date than the average male, coupled with the existence of a slightly greater need for fillings among females, suggests a higher incidence of dental decay among females.

EXTRACTIONS

More teeth required extraction because of decay than for any other reason, through age 39 in women and through age 34 in men. For patients over these ages, periodontal disease was the reason for between two and three times as many extractions as dental decay. The average need for extractions because of decay did not decline greatly with age, but the number of extractions owing to periodontal disease increased markedly. The average need for extractions because of periodontal disease was over 50 per cent higher in men than in women. Impaction as a reason for extraction was greatest in the age group 20 to 29.

Males required more extractions than did females, and this difference was most marked at the upper age levels. For adults, the two averages were 2.00 and 1.55, respectively.

Decay was the reason given for 41.4

per cent of the extractions required; periodontal disease, 38.3 per cent; prosthetic restoration as the sole reason, 10.9 per cent; impaction, 4.9 per cent; tooth fracture, 0.6 per cent, and other reasons, 3.9 per cent.

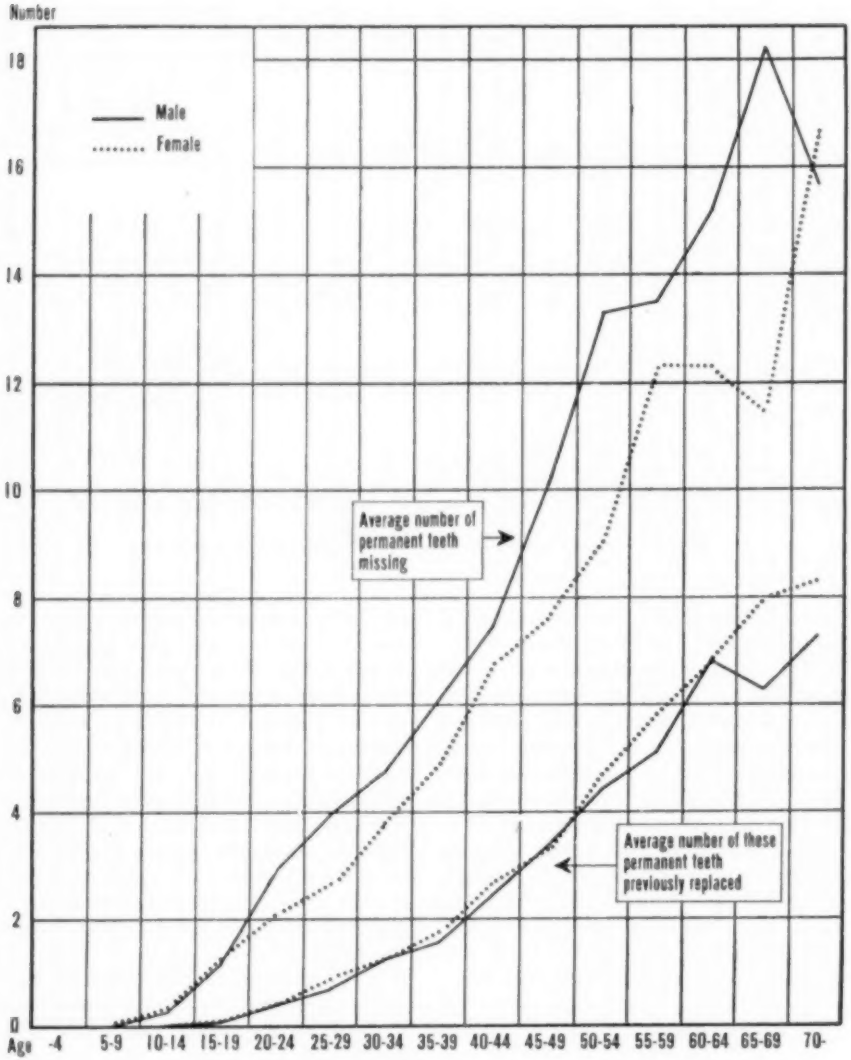


Fig. 5 • Average number of permanent teeth missing and average number of these permanent teeth previously replaced, by age and sex

Table 12 • Percentage distribution of dental patients (white), age 15 and over, according to number of permanent teeth missing

No. of teeth	% Males	% Females
0	28.0	34.0
1	8.7	8.9
2	8.2	9.2
3	6.4	6.7
4	6.6	6.3
5	4.2	5.0
6	3.9	3.7
7	2.4	3.0
8	3.0	3.2
9	2.1	2.3
10	1.8	1.9
11	1.5	1.1
12	1.4	1.5
13-15	3.0	2.9
16-18	3.4	2.0
19-21	3.0	1.5
22-24	2.7	1.3
25-27	1.1	.5
28	8.6	5.0
Total	100.0	100.0

CROWNS

Only about 5 per cent of the patients were adjudged to be in need of crowns of any type. The average need for crowns was about three times as great among adults as it was among patients under 15. Males averaged a slightly greater need for crowns than did females, but this difference was of doubtful statistical significance.

FIXED AND REMOVABLE BRIDGES

The need for fixed bridges was greatest for men and women in their twenties and thirties. Between one-fourth and one-fifth of all patients in these age brackets required a first fixed bridge. About one out of every 11 required a second fixed bridge and one out of every 50 a third fixed bridge. The average number of teeth to be replaced per fixed bridge was about 1.37. There was no appreciable difference in first, second and third fixed bridges with respect to number of teeth. Fourth fixed bridges were needed in so few cases (0.4 per cent) that they were omitted from the table. One patient needed a fifth fixed bridge.

Removable bridges were prescribed for about one-third as many patients as were fixed bridges. The average number of teeth per first removable bridge was 2.61; per second removable bridge, 2.52, and per third removable bridge, 1.99. Only four patients needed a fourth removable bridge.

PARTIAL AND COMPLETE DENTURES

Nearly one out of every six adult patients (15 years of age and over) was in need of a first partial denture, and about one out of 20 needed a second partial denture. The average number of teeth was 4.8 per first partial denture and 4.7 per second partial denture. The averages for males and females were identical.

The proportion of adult males needing both upper and lower complete dentures (10.1 per cent) was almost 50 per cent higher than the proportion of adult females having this need (6.8 per cent). However, the need for only one complete denture was approximately the same for both men and women. Of all adults needing complete dentures, 59.6

Table 13 • Percentage distribution of dental patients (white), age 15 and over, according to number of permanent teeth previously replaced

No. of teeth	% Males	% Females
0	74.7	73.2
1	4.3	5.5
2	3.1	3.3
3	2.0	2.0
4	2.1	2.4
5	1.4	1.4
6	1.2	1.3
7	.8	.9
8	1.3	1.1
9	.6	.6
10	.5	.5
11	.3	.3
12	.4	.5
13-15	2.4	2.4
16-18	.8	.9
19-21	.6	.7
22-24	.6	.7
25-27	.2	.2
28	2.6	2.1
Total	100.0	100.0

Table 14 • Dental needs of 685 negroes, by age and sex

253 negro males	Teeth needing fillings		Extractions		Complete dentures		Other replacements*	No dental needs†	Other dental conditions			
					Upper	Lower			Permanent teeth missing		Permanent teeth previously replaced	
Age	%	Avg.	%	Avg.	%	%	Avg.	%	%	Avg.	%	Avg.
-9	83.3	4.96	50.0	1.04	.0	.0	.17	16.7	8.3	.33	4.2	.08
10-19	86.1	4.86	63.9	1.56	2.8	2.8	.56	5.6	20.0	.74	.0	.00
20-29	69.2	2.90	66.7	2.31	2.6	.0	2.85	2.6	66.7	2.64	8.8	.09
30-39	50.9	3.05	73.7	4.19	15.8	14.0	2.93	1.8	82.2	5.76	14.6	1.27
40-49	21.4	.81	71.4	7.55	40.5	38.1	3.26	4.8	89.2	10.00	23.7	1.82
50-59	17.6	1.15	58.8	8.18	73.5	70.6	1.71	2.9	96.3	16.48	26.7	3.73
60-	14.3	.33	52.4	5.95	66.7	66.7	1.08	4.8	95.2	18.71	9.5	1.90
Total	49.4	2.61	64.8	4.47	26.5	24.9	2.06	4.7	66.2	7.15	13.0	1.25
432 negro females												
Age												
-9	75.0	3.97	65.6	1.87	.0	.0	.00	9.4	3.2	.03	.0	.00
10-19	78.2	4.75	52.7	1.38	1.8	.0	.77	10.9	38.9	.78	3.7	.09
20-29	69.2	3.64	71.0	2.97	8.4	4.7	2.94	3.7	63.3	3.83	11.8	.60
30-39	65.4	3.37	61.7	3.15	12.3	9.9	3.46	4.9	80.6	5.82	19.1	1.29
40-49	36.7	1.25	69.2	5.95	39.2	38.0	3.86	2.5	90.0	12.26	28.6	2.59
50-59	19.6	.65	60.8	5.86	50.0	47.1	2.16	2.0	93.2	14.32	33.3	3.96
60-	3.7	.07	40.7	5.11	55.6	66.7	.89	3.7	83.0	19.80	30.0	6.00
Total	54.2	2.74	63.1	3.74	21.1	19.7	2.49	4.9	67.4	7.10	17.6	2.00

*Average number of teeth needing replacement by fixed and removable bridges and partial dentures.

†Other than prophylaxis.

Note: "%" is the percentage of cases needing the specified dental service. "Avg." is the average need (in number of teeth) among all cases, including those with no need. To obtain the approximate average need among those cases needing a particular dental service, divide the average by the percentage and move the decimal point of the quotient two places to the right.

per cent needed both upper and lower dentures, 30.8 per cent needed an upper only, and 9.6 per cent needed a lower only.

OTHER DENTAL NEEDS

Nearly one-tenth of all adults required treatment for periodontal disease. Among those patients requiring periodontal treatment, the average number of teeth involved was about 14. The need for periodontal treatment increased gradually with age and appeared to level off at about age 40 and beyond.

The percentage of patients needing root canal treatment was the same for both males and females (2.1 per cent) and varied little with age. About one out of every 40 patients under 15 required pulpotomies. The need for space maintainers was greatest in the 5 to 9 age group, with the under 4 group second and the 10 to 14 group third.

Between one-fourth and one-fifth of patients 10 to 14 years old needed correction for malocclusion. Beyond that age the need diminished gradually. The percentages given for the upper age brackets, however, are probably without much meaning, because many dentists would not consider it feasible to correct malocclusion in an older patient.

The percentage of patients having no dental needs other than prophylaxis was greatest in the lowest age group (about 13 per cent). From age five and continuing throughout the age scale, the percentage of cases having no dental needs was almost constant, varying only slightly around 8 per cent.

PERMANENT TEETH MISSING AND REPLACED

Among female patients the percentage of missing permanent teeth that had been previously replaced by bridges and dentures was 41.9; among males it was 31.3. Males averaged a greater number of permanent teeth missing, but females averaged a greater number replaced (Fig. 5).

Tables 12 and 13 show the distribution of adult patients according to number of permanent teeth missing and number of these teeth previously replaced. The percentage having no permanent teeth missing is probably too high; the question as to the number of permanent teeth missing was at the end of the questionnaire and it appears to have been overlooked by a number of respondents. When such an oversight could be deduced from other information on the questionnaire, the question was tabulated as "no answer."

DENTAL NEEDS OF NEGROES

On the average, negroes required fewer fillings than white patients (Table 14). However, the need for extractions was much higher among negroes and the number of permanent teeth missing was substantially higher. In general, a smaller percentage of missing teeth had been previously replaced in negroes, and a smaller percentage of negro patients had no dental needs other than prophylaxis.

The next article in this series will be a study of dental needs according to the length of time since the patient last saw a dentist.

B. Duane Moen, Director

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

The subject matter of the films reviewed in this issue is in the field of prosthodontics. They are available from the Film Library at a nominal rental fee of $2.50. It is suggested that film programmers arrange their booking schedules as far in advance as possible to insure availability of their preferred film selections.

FILM REVIEWS

Preparation and Construction of an Acrylic Jacket for Use as Abutment or Individual Crown • 16 mm., color, silent, 800 feet, 30 minutes. Produced in 1950 by Gilbert W. Schwartz, D.D.S., and J. R. Schwartz, D. D.S. Procurable on loan ($2.50) from the American Dental Association Film Library, 222 E. Superior St., Chicago 11, and on loan or purchase from Drs. G. W. and J. R. Schwartz, 745 Fifth Ave., New York 22.

This film shows the complete operative and laboratory procedures used in the construction of an acrylic crown. Although silent, the titles and legends make it self-explanatory. It is well organized and the intraoral shots are made clearly visible by good photography and lighting. This film is suitable for use with senior dental students, general practitioners and prosthodontists. Dental societies and study clubs may find it interesting program material since it will motivate discussion of the technic involved. It could be used on the same program with the film, "Forming and Firing a Porcelain Jacket Crown," also reviewed in this issue. The technics shown in the two films might be compared and discussed.

Forming and Firing a Porcelain Jacket Crown • 16 mm., color, silent, 31 minutes. Produced in 1951 by the University of Minnesota School of Dentistry. Photography by James H. Rothenberger. Demonstrated by Douglas H. Yock, D.D.S. Procurable on loan ($2.50) from the American Dental Association Film Library, 222 E. Superior St., Chicago 11.

This film demonstrates the processes involved in the forming and firing of a porcelain jacket crown. It is designed for the dentist or dental student who is not accustomed to manipulating porcelain. It presents a comparatively simple technic whereby good results may be obtained. The film is well organized. Although silent, the titles and legends make it self-explanatory. The photography and lighting are good, making all the intraoral shots clearly visible. This is a valuable teaching film for dental students and general practitioners. It is also interesting to prosthodontists. It may be combined with other films on the topic and be used for discussion purposes by study clubs and dental societies.

TECHNICAL AND PHYSICAL ASPECTS IN FILM PROGRAM PLANNING

In the January issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, page 72, a brief discussion of some of the steps involved in the utilization of films by dental societies and other professional or community groups was begun. These steps included the necessity for planning programs in advance for film previews, film selection, and technics for effective presentation. Too much emphasis cannot be given to the importance of the planning stage.

Experience has shown that too often the program planners neglect the "technical and physical aspects in film program planning." For example, at a dental meeting a large crowd had gathered to see a film and to hear the author comment on a very popular topic. Ten minutes prior to the scheduled showing, the 16 mm. projector was still being investigated by someone who was trying to discover its method of functioning, and the projection screen was suspended by a rope from the ceiling at a 15 degree angle. No one in the audience seemed disturbed or interested in the trial and error manipulation of the projectionist until someone discovered that the projectionist was also the scheduled speaker. Then assistance

was given and, although the screen could not be adjusted, the showing proceeded. Proper attention to such technical details is an important function of the program planning committee. The program planners should have made provisions for a projectionist or have designated a member of their society to act as one, thereby extending a modicum of courtesy to the speaker and insuring a smooth film presentation. If the projectionist were not able to assume responsibility for checking on the projection screen, its position, distance from the audience, and so on, some other provision should have been made. A preliminary check should be made on focus by running several feet of the film in advance. Spare lamps, exciter lamps and fuses should be on hand in case of emergency.

Planning the physical arrangements, however, is just as important as planning the technical arrangements. If the room is too wide or too small for the attendance anticipated, or the ventilation and darkening facilities are poor, the popularity of the subject matter of the film or the prominence of the speaker may not compensate for the physical inadequacies. Ideally speaking, the room should be twice as long as it is wide to insure clear visibility by the audience. For persons who are seated two or three feet or more to the right or left of the projection screen, the visual image is distorted. Improper ventilation may cause the audience to be distracted or perhaps to leave or it may induce somnolence. It can be seen that ventilation is not as trivial as it is sometimes considered.

If darkening shades are not available, the planning committee should improvise drapes as a temporary measure. If it is a permanent meeting room, however, more adequate provision should be made.

It is hoped that these points will assist future film program planners. Other requisites for an effective film program will be discussed in subsequent issues of THE JOURNAL.

COUNCIL ON DENTAL RESEARCH

Additions to and revisions of the list of certified dental materials

Since the publication of the most recently revised List of Certified Dental Materials (revised to September 1952), the following materials which conform to the American Dental Association Specifications have been added.

CERTIFIED INLAY CASTING GOLD ALLOYS (A.D.A. SPECIFICATION NO. 5)

TYPE A, SOFT

Alloy	*Manufacturer or distributor*
Noble No. 1	Noble Metals & Alloys Co.

TYPE B, MEDIUM

Mowrey's No. 91	W. E. Mowrey Co.
Mowrey's S-2	W. E. Mowrey Co.
Noble No. 2	Noble Metals & Alloys Co.

TYPE C, HARD

Mowrey's Special	W. E. Mowrey Co.
Mowrey's No. 120	W. E. Mowrey Co.
Noble No. 3	Noble Metals & Alloys Co.

CERTIFIED DENTURE RESINS (A.D.A. SPECIFICATION NO. 12)

Material	*Form*	*Manufacturer or distributor*
Q.E.D.	Pink; powder-liquid	H. D. Justi & Son, Inc.

Samples of the certified inlay casting waxes and of the certified dental mercuries were recently retested by the American Dental Association Research Fellowship at the National Bureau of Standards under the supervision of the Bureau. These materials were found to comply with the American Dental Association Specification No. 4 for Inlay Casting Waxes and the American Dental Association Specification No. 6 for Dental Mercuries, respectively. This list supersedes that published in the November 1952 issue of THE JOURNAL.

CERTIFIED INLAY CASTING WAXES (A.D.A. SPECIFICATION NO. 4)

Wax	*Manufacturer or distributor*
Baker-Blue—Regular Medium	Baker & Co., Inc.
Caulk-Blue	The L. D. Caulk Co.
Kerr-Blue—Hard	Kerr Mfg. Co.
Security	The Cleveland Dental Mfg. Co.

CERTIFIED DENTAL MERCURIES (A.D.A. SPECIFICATION NO. 6)

Mercury	*Manufacturer or distributor*
Argentum	Hammond Dental Manufacturing Co.
Ballard's	Quicksilver Producers Association
Certified	Lee S. Smith & Son Mfg. Co.
Chemically Pure	The S. S. White Dental Mfg. Co.
C. P. Mercury	Goldsmith Bros. Smelting & Refining Co.
Crown	General Refineries, Inc.
Dee Brilliant Mercury	Kerr Manufacturing Co.
Dental	Drug Laboratories, Inc.
Dental, C. P.	F. W. Berk & Co., Inc.
Fellowship	Dental Protective Supply Co.
Garfield's	Garfield Smelting & Refining Co.
Garhart's Positively Pure	Garhart Dental Specialty Co.
Krause's Pure	Krause Gold Refineries
Mercury C. P.	Metalsalts Corp.
Mercury C. P.	Wildberg Bros. Smelting & Refining Co.
Mercury NF IX Redistilled	Mallinckrodt Chemical Works
Minimax	The Minimax Co.
Mission	Henry F. Bruce Co.
Mynol	Mynol Chemical Co.
Ney's C. P.	The J. M. Ney Co.
Odontographic	Odontographic Mfg. Co.
Research	Precious Metals Research Works, Inc.
Spectropure	Baker & Co., Inc.
*Spyco	Spyco Smelting & Refining Co.
Twentieth Century	The L. D. Caulk Co.
Williams	The Williams Gold Refining Co., Inc.

*Since the resurvey of mercuries was made, a newly certified product has been added to the list.

FEBRUARY 1953

LON W. MORREY, D.D.S., EDITOR

VOLUME 46 • NUMBER 2

Published by the American Dental Association
222 East Superior Street • Chicago 11, Illinois

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

Health care for all. The President's Commission on Health reports on the needs of the nation

Two statements stand out in volume one of the report of the President's Commission on the Health Needs of the Nation, issued December 18, which epitomize the philosophy of that Commission and, indeed, represent the thinking of an ever-increasing segment of our population. (1) The maintenance of health must now be added to food, shelter and clothing as one of the necessities of living. (2) As a goal for this nation a situation should be established in which adequate health personnel, facilities and organization make comprehensive health services available for all, with a method of financing to make this care universally accessible. Few serious thinking people will object to these goals but many will question some of the methods advocated for reaching them. (See page 220 of this issue.)

The report of the President's Commission on health presents the conclusions of a group of distinguished professional and lay people who, for the past year, probed the problems associated with the health needs of this country and recommended methods of supplying those needs. Representing dentistry on the Commission was Lester W. Burket of Philadelphia, who succeeded Ernest G. Sloman of San Francisco, deceased.

How sound the reasoning and recommendations of the Commission are cannot be determined until the 80-page report has been reviewed and analyzed by health, welfare and civic authorities throughout the nation. Such an analysis is now being made by the Council on Dental Health of the Association and will be published in an early issue of THE JOURNAL. A first rapid reading of the Commission's report impresses the reader with its comprehensiveness. A few individual items, observations and recommendations stick out in places indicating that the study, conceived and conducted by fallible men, may contain some faults. One of the recommendations which has been pointed out as objectionable is a method of financing health services which,

it is alleged, if adopted would precipitate the country into a system of compulsory health insurance—a system to which this Association is unalterably opposed. The recommendation reads: "Funds collected through the OASI mechanism be utilized to purchase personal health service benefits on a prepayment basis for beneficiaries of that insurance program, under a plan which meets Federal standards and which does not involve a means test." Under this proposal the federal government, using funds collected through social security payroll deductions, would partly finance a proposed federal-state plan of administering health benefits. Whether the Commission made this recommendation with the intention that this method should be universally applied for all OASI beneficiaries or whether it might be employed to supplement present voluntary prepayment plans is not obvious from the report and cannot be determined until the Council on Dental Health completes its analysis. Such doubts and uncertainties will cause the full report to be scrutinized doubly for other questionable recommendations.

In buttressing its thesis that health is of front rank importance to the nation the Commission points out that "health means more than freedom from disease, freedom from pain and freedom from untimely death. It means optimum physical, mental and social efficiency and well-being. . . . The degree to which individuals, voluntary groups and the state cooperate successfully in providing for the health of all represents the maturity and level of civilization of the nation. . . ."

These are high aims and brave words. These are recommendations to which most solid citizens will subscribe—at least they will give them lip service. Few wish to be ill; most wish to be well, but few will work diligently to obtain their health goals. Although the Commission recognizes the impact of human weakness on individual and national health it fails to emphasize sufficiently the role of health education in preventing disease and injury. Statistics prove annually that most people—including so-called intelligent people—knowingly and regularly violate the simplest rules of health conduct. With all due respect to the President's Commission on the Health Needs of the Nation it is going to take more than an 80-page report and a few recommendations to motivate the majority of the American people to practice daily the well-known rules of health, much less to provide themselves and families with health services at the expense of more pleasurable items.

Danger ahead: proceed with caution

The antibiotics offer an increasingly provocative prospect to the dentist for the treatment of infection in the mouth and for infections associated with mouth conditions. This interest is attested by articles contributed to the present number of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION on various aspects of the subject. The mouth conditions for which antibiotics have been considered range all the way from cold sores and Vincent's stomatitis, through the strictly dental diseases—caries, pulp involvement, and periodontitis—to bone conditions requiring extensive surgery and ailments related to the teeth, remote from the mouth. The antibiotics are used prophylactically for patients with a history of rheumatic fever who are undergoing

extraction of teeth and as a curative measure for Ludwig's angina and osteomyelitis of the jaw.

In some instances, the literature reports only negative experimental results; in others, the reports show decided clinical successes. It must be emphasized, however, that effectiveness in the elimination of infection, though the aim of the treatment, is not the most valid criterion for its approval. The first precept of good therapeutics is that the treatment should entail as little untoward effect as is consistent with the good accomplished. Since the antibiotics are far from harmless drugs, the dentist must always weigh the hazards of the medicament against the specific need and tolerance of the patient. Convenience for the dentist and spectacular results are not sufficient to justify the employment of an antibiotic. *Primum non nocere!* (First of all, do no harm!)

Before administering antibiotic treatment, the practitioner must answer the following questions: Is the infection sufficiently serious to warrant the use of a drug the efficacy of which for critical situations may be impaired by previous administration to the patient? Can the infection be adequately treated by other available means? Have other appropriate measures been taken? Does the specific nature of the infection indicate that the antibiotic will be effective in eliminating the causative organisms? Does the patient's previous history imply that he will suffer no serious reactions from administration of the antibiotic? Does the method of administration appropriate to the specific situation promise a safe and effective outcome? In many cases, if the dentist should ask himself these questions, his answers would preclude the use of an antibiotic.

The history of antibiotic therapy is far from complete at the present time. New antibiotics are being reported at short intervals and continuing study will extend our knowledge of their pharmacology and clinical usefulness. Development of knowledge in this field may give to the antibiotics a greater latitude of indication for their employment in dentistry in days to come, but today the dentist, as some of THE JOURNAL'S contributors imply, serves his patient best by resorting to antibiotic treatment only after he has critically considered the potentialities of the drug and satisfied himself that, in the circumstances of the case, it is the medicament of choice.

Washington News Letter

The new government in Washington is making haste slowly. Both Congress and President Eisenhower have made it clear that they want all facts for screening and sifting before they will make decisions on domestic issues of major importance. These include reductions in taxes, governmental reorganization, proposed changes in social security benefits and other matters in which dentistry has general and specific interest.

It is probable that only the doctor-draft law will carry a "rush" label, but even this measure will not be railroaded through as quickly as the original act was hustled through Congress in 1950. Not only will public hearings be conducted by the Armed Services Committees of House and Senate, but there is every likelihood that the subject will be debated more freely prior to final chamber action than was the case nearly two and one half years ago.

At this writing, President Eisenhower had not yet delivered his State of the Union message, in which he was to recommend a legislative program to Congress. On the basis of his recent utterances, Washington observers have not assumed that the Chief Executive will call for any extraordinary national health legislation. It was regarded as probable, however, that he would advocate reorganization of the Federal Security Agency, lately the stronghold of Oscar R. Ewing, foremost champion of socialized medicine. Quite conceivably he will urge establishment of a Department of Health and Security.

It will devolve, in the main, upon members of the Democratic minority in Congress to press for legislation which the Roosevelt and Truman administrations sought unsuccessfully to obtain—federal financial aid to medical, dental and nursing education; increased appropriations for dental research; subsidization of local public health units throughout the country; liberalization of social security laws to include permanent and total disability insurance. In this category one might also place compulsory national health insurance, although present signs indicate that even the most "Fair Dealish" among the Democrats in House and Senate are disinclined to stick their necks out on an issue which has been proved to have little popular backing.

Newly organized Congressional committees will consider proposed legislation. Most bills having implications of interest and importance to dentistry will be handled by the Senate Labor and Public Welfare Committee and the House Committee on Interstate and Foreign Commerce. Their chairmen, respectively, are Sen. H. Alexander Smith and Rep. Charles A. Wolverton. Both are New Jersey Republicans. The latter has stated that he plans to invite the American Dental Association and other national organizations in the health field to appear before his committee and express their views on legislative questions.

A new member of the House of Representatives who has attracted favorable notice for his candor and congeniality is Rep. George Shannon Long, Democrat, of Louisiana. This is his golden anniversary year as a graduate in dentistry and he possesses a number of firm convictions relating to the profession. For one thing—all this came out in an interview on Capitol Hill—he believes there is too much specialization in both dentistry and medicine. Further, he thinks that the average purse can't afford to provide its owner with adequate medical

and dental care at the present scale of fees—unless some form of federal or state subsidy can be devised.

"What the answers are, I don't profess to know," said Dr. Long. "It's going to take a lot of serious discussion by the professions and Congress to produce the solutions as to helping the average American pay his medical and dental bills and making things a bit easier for the young man or young woman who has an aptitude for medicine or dentistry but lacks the financial means for getting a professional education."

A brother of the late Huey Long, the new Louisiana Congressman was born in a log cabin in 1883. He is a 32nd degree Mason, a Shriner and a Kiwanian.

INDUCTION OF DENTISTS

On January 15, Department of Defense notified Selective Service headquarters that 258 dentists would be required for induction in March, of whom 213 would be allocated to the Army and the remainder to the Air Force. According to regular monthly practice, the states will receive their quotas from Washington early in February.

The latest Selective Service compilation, as of November 30, 1952, discloses the following data on dentists who are special registrants under Public Law 779:

Total living special registrants: Priority I, 4,311; Priority II, 826; Priority III, 14,747; Priority IV, 17,805.

Total in 1-A and 1-A-O, examined and acceptable: Priority I, 66; Priority II, 29; Priority III, 1,420; Priority IV, not yet reached.

Total on active military duty: Priority I, 2,244; Priority II, 219; Priority III, 161; Priority IV, 2.

Total holding Reserve commissions, but on inactive duty: Priority I, 688; Priority II, 182; Priority III, 199; Priority IV, 1.

Deferred on grounds of essentiality: Priority I, 230; Priority II, 82; Priority III, 1,161; Priority IV, 0.

Deferred for physical disqualification: Priority I, 765; Priority II, 188; Priority III, 1,415; Priority IV, 0.

Deferred for other reasons: Priority I, 118; Priority II, 30; Priority III, 297; Priority IV, 13.

According to the compilation, 12 physicians, 11 dentists and one veterinarian have been inducted into the armed services as privates since July 1951.

During the first part of January, the U. S. Supreme Court heard oral arguments in the case of Stanley J. Orloff, a New York psychiatrist who is contesting his induction. The lower courts rejected his contention that he is being held in uniform illegally because the Army is not utilizing him as a physician.

Report of the President's Commission on the Health Needs of the Nation

(Following text is from the introduction to the report of the President's Commission on the Health Needs of the Nation, which was issued December 18, 1952.)

The maintenance of health must now be added to food, shelter and clothing as one of the necessities of living. Health means more than freedom from disease, freedom from pain, freedom from untimely death. It means optimum physical, mental, and social efficiency and well-being. The individual ranks health for himself, and for his family even more, high in the scale of human aspirations. . . .

It is now abundantly clear that the provision of adequate health services profoundly affects the individual's chances of survival and the strength and happiness of the Nation as well. This fact imposes certain ethical and practical considerations upon us. When the very life of a man, or the lives of his family, may depend upon his receiving adequate medical services, society must make every effort to provide them. When this man knows that such health boons exist, available to some and denied to him, a free society will find the way to comply with the demand that he will surely make. These benefits sometimes can be obtained by the individual's own effort; but when these efforts fail, other means must be found.

Individual and Social Responsibility • The individual effort of an informed person will do more for his health and that of his family than all the things which can be done for them. In the past, measures for health maintenance demanded individual responsibility only to a limited degree. . . .

Future accomplishments, however, depend to an even greater degree upon the individual's assumption of responsibility for his own health. It is the individual who must consult his physician for early care, avoid obesity and alcoholism, and drive his automobile safely. These things cannot be done for him. They require both information and motivation. Personal health practices which are determined by the individual's knowledge, attitude and decision have now become of paramount importance in gaining health.

Recognition of the significance of individual responsibility for health does not discharge the obligation of a society which is interested in the health of its citizenry. Such recognition, in fact, increases social responsibility for health. . . . Society must assure its citizens access to professional services, education concerning personal health practices, and a reasonably safe physical environment. Only then can individual responsibility for health exercised through personal action reach its full potential. . . .

Government and Health Services • Hence, the community—and particularly the most responsible community organization, government—must participate in the expansion of means to achieve health. In assuring the development of proper facilities and in seeing that comprehensive health services are made available to all, the local, State and Federal government have both separate and joint responsibilities.

The local community (or region) should be the focus for the administration of most of the direct medical services provided to the individual. Its local health unit should be adequate to the task of supplying community-wide sanitation and preventive services. . . .

State governments have many responsibilities in the health field in addition to giving both financial and advisory assistance to local community health services. They have the traditional responsibility of caring for the mentally ill and the tuberculous.

The Federal Government, first of all, is responsible for seeing that our Nation's military personnel and our veterans get the highest quality of medical care. It also must provide services to such special groups as merchant seamen and Indians.

Then, since the good health of our people is a national resource, the Federal Government has a major responsibility for promoting and stimulating a comprehensive health program for all our people. The Federal Government, therefore, must provide leadership and initiative in planning the development of our health resources. . . . One of the most important roles of the Federal Government in health is to act as a catalyst, to stimulate new programs and to expand existing ones. In this connection the grant-in-aid principle has already proved itself to be an effective mechanism for arousing state and local effort. . . .

In considering the roles of the individual

and various elements of Government in securing health services, one must not lose sight of a most precious relationship for health. Throughout the whole history of civilized man the relationship between patient and physician has been a special thing. In days when scientific knowledge was scanty, this relationship yielded about all the benefits the patient received. Even today, all the complex arrangements that exist to provide medical care have not replaced it. The patient's confidence in his physician underlies most successful care. But now the physician needs more than knowledge of human nature and love of mankind. To be effective in the modern sense he must have the help that the modern hospital supplies, the assistance of trained helpers, and adequate facilities.

Comprehensive Health Services • The physician no longer makes his sole contribution to the health of individuals and the Nation by treating disease. Now, a broader view of health service is being developed—one that takes into account more than what a physician does in the diagnosis and treatment of disease. It includes things that are done in the absence of disease, namely, the promotion of health and prevention of disease; and what is done beyond the ordinary treatment of disease, namely, rehabilitation. This view, a spectrum of comprehensive health services, specifically includes the contribution of a variety of personnel and of community services. The physician leads the over-all effort, but as one member of a well-trained team comprised of dentists, nurses, technicians, and many other professional health workers. Only through such joint endeavor can the whole range of services be delivered.

Health Principles • From such considerations the Commission has formulated these principles to be used as a guide in approaching our health problem.

WE BELIEVE THAT:

1. Access to the means for the attainment and preservation of health is a basic human right.

2. Effort of the individual himself is a vitally important factor in attaining and maintaining health.

3. The physician-patient relationship is so fundamental to health that everyone should have a personal physician.

4. The physician should have access to proper facilities and equipment, affiliation on some basis with a hospital, and the help of trained personnel in order to fulfill his part in providing comprehensive health services.

5. Comprehensive health service includes the positive promotion of health, the prevention of disease, the diagnosis and treatment of disease, the rehabilitation of the disabled—all supported by constantly improving education of personnel and a continuous program of research.

6. Comprehensive health service is the concern of society and is best insured when all elements of society participate in providing it.

7. Responsibility for health is a joint one, with the individual citizen and local, State, Federal governments each having major contributions to make toward its fuller realization.

8. The American people desire and deserve comprehensive health service of the highest quality and in our dynamic expanding economy the means can be found to provide it.

9. The same high quality of health services should be available to all people equally.

10. A health program must take into account the progress and experience of the past, the realities of the present, and must be flexible enough to cope with future changes.

We set as a goal for this Nation a situation in which adequate health personnel, facilities and organization make comprehensive health services available for all, with a method of financing to make this care universally accessible. . . . We seek the expansion of our educational system so that an adequate number of physicians and all other needed health personnel will be trained, with every qualified boy and girl having an equal opportunity to enter the professions. We favor continued research into health problems, including the training of an adequate number of scientific workers and providing them with facilities to carry out their work.

We believe it is well within the economic potential of this country to provide itself with the finest system of medical care in the world, that the American people desire this and deserve no less. We believe that it is true economy to invest in bigger and better health services, since the cost of adequate health promotion and protection is probably far less than the cost involved to the Nation through its neglect of health. . . .

Finally, we are convinced that the good health of the American people is a powerful democratic resource in our effort to build a united, free world. By the same token, our civil defense health services can be only as strong as the resources which underlie them. Constant planning and building of our basic health services, therefore, strengthen the ramparts of civil defense and increase the vitality of our leadership in the free world.

Association Affairs

1952 ASSOCIATION MEMBERSHIP LISTED AT RECORD TOTAL

Membership in the American Dental Association reached a record total of 77,722 as of December 31, 1952, it was recently announced by the Council on Membership.

The 1952 total included 65,085 active, 2,870 life, 22 affiliate, 9 associate, 9 honorary and 9,527 student members. The total represents an increase of 1.9 per cent over the 1951 figure of 66,886. The number of active dues paying members increased by 860 during the last year, but it is still 564 less than the 1950 figure.

ASSOCIATION PRESIDENT ASKS DECAY PREVENTION MEASURES

On the occasion of the fifth annual nationwide observance of National Children's Dental Health Day, February 2, Otto W. Brandhorst, president of the American Dental Association, issued the following statement:

By the time a child goes to school, he usually has three decayed teeth. By the time he is 21, he has lost nearly five teeth from decay. And by the time he reaches middle age, his mouth is badly crippled by dental disease.

There is little excuse today for these appalling statistics considering the preventive measures that have been developed against dental decay.

The fluoridation of community water supplies is the most effective, large-scale preventive of tooth decay to be developed, yet there are many communities in our nation that have, for one reason or another, failed to place this safe and inexpensive procedure in operation.

Dental health education and early care for all children are other measures which can effectively reduce the amount of dental disease among our population.

That is why the American Dental Association believes that the most effective way of improving the nation's dental health is through establishing community dental health programs for fluoridation of water supplies, for dental health education and for early dental care for all children.

HEALTH COMMITTEE HONORS ASSOCIATION REPRESENTATIVE

Harold Hillenbrand, secretary of the Association, was elected secretary of the Inter-Association Committee on Health during a meeting of the organization January 10 in New York. The Committee is composed of representatives of the American Medical Association, the American Hospital Association, American Nurses' Association, the American Public Health Association, American Public Welfare Association and the American Dental Association.

Representatives of the Association, in addition to Dr. Hillenbrand, are Otto W. Brandhorst of St. Louis, Percy T. Phillips of New York and Kenneth A. Easlick of Ann Arbor, Mich.

RELIEF FUND DRIVE REACHES THREE FOURTHS OF GOAL

Contributions to the Relief Fund of the Association had reached 75 per cent of the $100,000 goal and seven constituent societies had topped their quotas as of January 15, it was announced by Leo W. Kremer of Fort Lauderdale, Florida, chairman.

Total contributions from 23,126 Association members totaled $74,658.28. The seven societies which had achieved their goals are Alabama, Alaska, Idaho,

Montana, North Dakota, Oklahoma and Wyoming. Nine other societies which had reached 90 per cent of their quotas are Florida, Hawaii, Indiana, Nebraska, Nevada, New Hampshire, New Mexico, Washington and West Virginia.

Contributions to the Relief Fund are used to aid needy dentists and their families. Half of each contribution is placed in the Fund of the Association and half is placed in the relief fund of the state society of which the donor is a member. Donations may be sent to the American Dental Association Relief Fund, 222 East Superior Street, Chicago.

EDUCATORS, SPECIALISTS TO SPEAK AT CONFERENCE

Five eminent dental educators and administrators and five diplomates of specialty boards will participate in the Council on Dental Education's ninth Congress on Dental Education and Licensure, to be held February 7 in the Conrad Hilton Hotel, Chicago.

A panel on "What admissions requirements should be used in dental schools?" will be presided over by John E. Buhler, dean of the Atlanta-Southern Dental College, Emory University.

Panel members of the morning session, which will begin at 9 A.M., will include Berton E. Anderson, director of postgraduate dental education, University of Washington (Seattle) School of Dentistry; George R. Moon, examiner and recorder of the University of Illinois College of Dentistry; the Rev. William D. O'Leary, S. J., regent of the School of Dentistry, Loyola University (New Orleans), and Wendell L. Wylie, chairman of the division of orthodontics, University of California College of Dentistry.

The afternoon panel will discuss "What constitutes a specialty in dentistry?" Allen G. Brodie of the American Board of Orthodontics will be moderator. Panel participants will be Paul E. Boyle of the American Board of Oral Pathology, Irving R. Hardy of the American Board of Prosthodontics, Ralph L. Ireland of the American Board of Pedodontics and William A. Jordan of the American Board of Dental Public Health.

General discussion and audience participation will follow the panel discussions, announces Bert L. Hooper, chairman of the Council and the committee in charge.

JUNE CONFERENCE TO DISCUSS NEW DENTAL TERMS

"Supplementing the Dental Dictionary" will be the topic of the 1953 nomenclature conference sponsored by the Bureau of Library and Indexing Service, it was

Three members of the Central Office staff who have completed 25 years as employees of the Association recently were presented engraved silver platters in recognition of their service. The three staff members are (l. to r.) Mrs. Josephine P. Hunt, Bureau of Library and Indexing Service; Miss Marion D. Luehring, Subscription Department, and Miss Martha Ann Mann, Bureau of Library and Indexing Service.

recently announced by Donald Washburn, director of the Bureau. The two-day conference will be held at the Central Office early in June; definite dates will be announced later.

A session on "the dental vocabulary since 1936" and lectures and discussion on scientific nomenclature and new dental concepts and terms will constitute the program of the first day. A morning workshop session for committees representing various branches of dental science will be followed on the second day by an afternoon session of committee reports and discussions by the conference members.

DRAFT INFORMATION ISSUED TO ASSOCIATION MEMBERS

"A Report on the Current Draft Situation: Present and Future Needs of the Armed Services," the first information bulletin of 1953, has been issued by the Association's Bureau of Public Information to all members of the Association.

The four-page bulletin outlines the estimated need for dental officer replacements in military service during the next two and one-half years and summarizes the status of registrants as of October 1952. The provisions of Public Law 779 are reviewed, together with proposals advanced by the Association for any new dental officer recruitment law which may be needed.

Additional copies of the bulletin may be obtained by writing to the Bureau of Public Information of the Association, 222 East Superior Street, Chicago 11.

APPOINT ASSISTANT SECRETARY TO COUNCIL ON LEGISLATION

A former counsel of the Office of Price Stabilization in Chicago and Washington, D. C., has been appointed assistant secretary of the Council on Legislation to succeed Bernard J. Conway, it has been announced by Harold Hillenbrand, secretary of the Association.

The Council's new assistant secretary is Howard N. Greenblatt of Chicago. He is a graduate of Washington and Lee University and Northwestern University's law school, and was admitted to the bar of Illinois in 1949. He served in the office of the chief counsel of the Office of Price Stabilization in Washington and Chicago after engaging in private practice and serving as assistant to the executive vice-president of Hart, Schaffner and Marx.

DEADLINE FOR APPLYING FOR LIFE MEMBERSHIPS SET

Applications for life membership in the American Dental Association must be received in the Central Office not later than July 29, 1953. This ruling is in accordance with the Board of Trustees' provision that no life membership applications will be accepted later than 60 days in advance of the annual session.

Any dentist who has reached the age of 65 and has been a member of the American Dental Association for 35 years, may apply for life membership. A certificate is awarded to each life member, and he is not required to pay annual dues in the Association as long as he maintains active membership in his constituent and component societies.

Application forms may be obtained from the Membership Department, American Dental Association, 222 East Superior Street, Chicago 11.

INDEX TO VOLUME 45 OF JOURNAL AVAILABLE

The index to volume 45 of THE JOURNAL, covering issues of the last six months of 1952, is now available without charge. Requests for copies may be addressed to the subscription department, American Dental Association, 222 East Superior Street, Chicago 11.

National Defense

ARMY BEGINS CONSTRUCTION OF NEW DENTAL LABORATORY

Ground was broken December 22 for a new building for the Central Dental Laboratory of the United States Army, a component of the Walter Reed Army Medical Center in Washington, D. C.

The $206,750 building, which will be completed in a year, is to be a two-story, flat-roofed structure, air-conditioned to offset the heat generated by the laboratory equipment. It will provide the laboratory with its first permanent quarters since its founding in 1927. The laboratory and its staff of 50 are currently accommodated in the Army Medical Service Graduate School's building.

Ground-breaking ceremonies were presided over by Col. Lynn C. Dirksen, commanding officer of the laboratory. Participating in the ceremonies were Maj. Gen. Paul H. Streit, commanding general of Walter Reed Army Medical Center; Maj. Gen. George Armstrong, Surgeon General of the Army; Maj. Gen. Walter D. Love, chief of the Army Dental Division; Brig. Gen. Oscar P. Snyder, director of dental activities at the center; Brig. Gen. Marvin E. Kennebeck, assistant for dental services of the Surgeon General's office, U. S. Air Force, and Capt. Ralph W. Taylor, commanding officer, U. S. Naval Dental School, National Naval Medical Center.

Others attending included Col. Arthur L. Irons, chief of Walter Reed Hospital's dental service; Lt. Col. Kenneth C. De-

Above is an architect's drawing of the new building being erected to house the Army's Central Dental Laboratory at Walter Reed Army Medical Center. Shown at ground-breaking ceremonies are (l. to r., inset) Brig. Gen. Oscar P. Snyder, director of dental activities at the Walter Reed Army Medical Center; Col. Lynn C. Dirksen, commanding officer of the laboratory; Maj. Gen. Paul H. Streit, commanding general of the Center; Capt. Ralph W. Taylor, commanding officer of the U. S. Naval Dental School, National Naval Medical Center, and Brig. Gen. Marvin H. Kennebeck, assistant for dental services of the Air Force.

The exhibit shown here, "The Role of Dentistry in Atomic Disaster," is being offered by the Navy's Bureau of Medicine and Surgery for display at larger dental society meetings. The Bureau will ship the exhibit without charge to approved meetings and will furnish a representative to set up the display and dismantle it. Enlarged colored transparencies in the exhibit illustrate the services dentists may perform in an atomic disaster. A projector automatically displays a series of colored slides showing the types of casualties to be expected; sketches illustrate first aid and emergency casualty services.

A special feature of this display is a plastic model of the human forearm (right), used for the teaching of intravenous injections. The model is covered by a vinyl resin "skin" and contains rubber tubes simulating blood vessels, which are filled with colored fluids under pressure. The model has been widely adopted for teaching and practice in locating blood vessels. The synthetic arm, which was developed in the laboratories of the Naval Dental School, is now manufactured by Medical Specialties, Inc., Box 214, Rochester, Minn.

The complete three-section display is 24 feet long, 8 feet high and 7½ feet deep. Any society desirous of showing this exhibit may write to the chief of the Dental Division, Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C.

Gon, chief of dental service, Fort Myer, Va., and Luzerne G. Jordan of Washington, D. C., consultant in prosthodontics at Walter Reed Army Medical Center.

DRAFT BOARDS TO RESCREEN DEFERRED REGISTRANTS

Priority I and II registrants now deferred for physical reasons and professional essentiality are being rescreened for possible induction, according to recent announcements of the Selective Service System.

Physical standards for dentists and physicians in the Armed Forces were lowered recently by the Department of Defense to permit "the acceptance for military duty of some individuals who have been rejected because of defects of sight or hearing, static deformities, chronic disease in an arrested state and other conditions."

Persons accepted because of the lowering of physical standards will be assigned to duty "consistent with the physical condition and ability of the individual," the Department of Defense bulletin states. Approximately 900 dentists in Priority I and II previously were classified 4-F.

Selective Service boards are also reviewing the "availability for military service" of the 300 Priority I and II dentists who have been deferred because they were considered essential to their communities.

INDUCTION OF 258 DENTISTS IN MARCH ORDERED

A March call-up of 258 dentists was ordered recently by the Department of Defense. Officials of the Department report that 213 of the dentists will be assigned to the Army and the remainder to the Air Force. The March induction will bring to 2,181 the number of dentists requested by the Armed Forces from Selective Service during the Korean War.

Legislation

BILLS ASK TAX EXEMPTIONS FOR PERSONAL PENSION FUNDS

Three bills designed to permit self-employed persons to finance their pension plans through tax-exempt funds were introduced during the opening sessions of the 83rd Congress.

Congressmen F. R. Coudert (R., N. Y.), E. J. Keogh (D., N. Y.) and T. A. Jenkins (R., Ohio) submitted to the House of Representatives similar bills which would permit self-employed persons to deduct from their taxable incomes a limited annual amount to be paid into voluntary retirement funds or pension plans.

For more than 10 years, corporations have been allowed to establish pension funds for their employees out of tax-free money. The American Dental Association has previously testified before Congress in support of similar tax exemptions for self-employed professional persons.

BILLS ON HEALTH CARE SUBMITTED TO CONGRESS

Among the bills concerning health care which were introduced in the opening sessions of the 83rd Congress are several providing for federal hospital benefits for certain disabled veterans, dependents of servicemen and elderly recipients of social security payments.

A bill introduced by Congressman J. C. Auchincloss (R., N. J.) would make tax-deductible any subscription charges to certain prepayment health care plans. Another bill, introduced by Sen. Lister Hill (D., Ala.) would establish federal grants to enable indigent persons to enroll in voluntary prepayment plans.

New bills similar to ones considered by the 82nd Congress include a bill to transfer Indian health services from the Department of the Interior to the U. S. Public Health Service, and a bill to establish a Department of Health in the executive branch of the government.

Dental Societies

PHILADELPHIA MEETING CLINICIANS LISTED

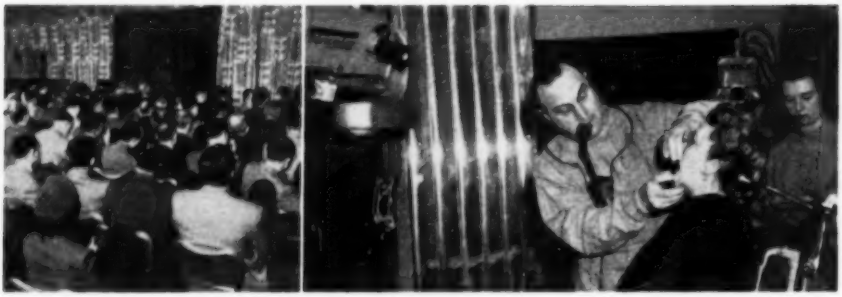
The Greater Philadelphia Annual Meeting of the Philadelphia County Dental Society, to be held February 4-6, will feature ten registered one-hour and two-hour clinics.

Clinicians will include Vernor H. Eman of Grand Rapids, Mich.; Clifford M. Sturdevant of Chapel Hill, N. C.; G. R. Lundquist of Chicago; Lt. Col. George H. Moulton of Washington, D.C.; William E. Cody of Denver; Lt. Col. Edwin H. Smith of Washington, D. C.; Ralph H. Campbell of Detroit, and Ralph F. Sommer of Ann Arbor, Mich.

Further information may be obtained by writing to the Philadelphia County Dental Society, suite 337-338, Bellevue-Stratford Hotel, Philadelphia 2.

DISTRICT OF COLUMBIA PLANS ANNUAL POSTGRADUATE CLINIC

Four topic discussions will be presented during the twenty-first annual postgraduate clinic of the District of Columbia Dental Society, to be held March 15-18 at the Shoreham Hotel, Washington, D. C.



An audience of 1,300 attended each of the color television sessions which opened the recent Greater New York Dental Meeting. Shown above is a section of the audience which viewed operations by means of ten television sets in two viewing rooms. At right, Herbert Kabnick of New York performs an operation before the camera, while describing it by microphone.

Subjects to be discussed include plastics in restorative dentistry, occlusion, looking forward in dentistry and children's dentistry.

The program of registered clinics and table clinics will be augmented by the presentation of essays, exhibits and a visual education program, reports Z. Bernard Lloyd of Washington, D. C., general chairman of the clinic.

International

SWISS DENTAL SOCIETY HEARS U. S. ARMY DENTAL SURGEON

Guest speaker at the recent meeting of the American Dental Association of Switzerland was Col. Beverley M. Epes, dental surgeon of the United States Army European Headquarters. Colonel Epes, formerly of the University of Pennsylvania dental faculty, spoke on fractures of the jaws and methods of splinting.

Other highlights of the meeting, as reported by Max Grogg of Basel, president of the Swiss organization, included a summary of "myths and truths" about chlorophyll, by Professor Jeanneret of Berne; an exposition of periodical filling of granulomas with apicoflux, by Dr. Prader of Davos, and an essay on the use of shoulderpin attachments, by Dr. Staehelin of Winterthur.

AUSTRALIAN DENTAL CONGRESS PROGRAM ANNOUNCED

The provisional program of the thirteenth Australian Dental Congress, to be held June 1-5 at the University of Queensland in Brisbane, has been issued by Professor S. F. Lumb, president of the Congress.

The scientific program of lectures and registered clinics will open on the afternoon of June 1 and will extend through June 4; the entire day of June 5 will be devoted to sports, sightseeing tours and a fishing excursion.

The president's dinner, to be held June 3, and the Congress Ball, to be held June 4 at the Brisbane City Hall, will highlight the social program. Toronto and Northwestern University alumni dinners will be held June 5.

Further information may be obtained from the Australian Dental Congress Commission, New Zealand Chamber, 334 Queen Street, Brisbane, Australia.

INTERNATIONAL SOCIETY OF PERIODONTISTS TO MEET

The thirteenth Congress of Periodontology, sponsored by the Association for Research on Periodontal Diseases (ARPA Internationale), will meet July 13-19 in Geneva, Switzerland.

Symposiums on early periodontal lesions, immediate therapy and the social aspects of treatment of periodontal lesions will be presented by Francisco Pucci of Montevideo, Uruguay; Charles Aye and Andree Chaput of Paris, France; Ewald Harndt of Berlin, Germany; Silvio Palazzi of Milan, Italy; W. George Cross of London, England, and others.

Essayists who wish to present a paper at the meeting must send it, together with an abstract of less than 200 words, by March 31 to Prof. A. J. Held, Institut Dentaire, Geneva, Switzerland.

STUDY CLUB OF MEXICO PLANS ANNUAL DENTAL SEMINAR

The sixth annual seminar of the University of Southern California Dental Study Club of Mexico will be held May 17-21 at the Hotel Penafiel, Tehuacan, Puebla, Mexico. A fee of $60 will cover hotel accommodations, meals and tuition.

Dentists who wish to attend the seminar may write to Guillermo Riquelme Cires, secretary, Paseo de la Reforma 95-803, Mexico City, or Roberto E. Woodworth, treasurer, Melchor Ocampo 487-302, Mexico City.

PHILIPPINE DENTAL GROUP ANNOUNCES APRIL CONFERENCE

A dental conference in observance of the golden anniversary of the dental profession in the Philippines will be held in April, in conjunction with the Philippine International Fair, it has been announced by the Federation of Dental Practitioners of the Philippines.

Any dentists who might wish to present a clinic or an essay at the conference may write to Ermelo Vergel de Dios, president of the Federation, 1006 Taft Avenue, Manila, Philippine Islands.

CHILEAN DENTISTS TO BEGIN FLUORIDATION PROGRAM

In April, a program of fluoridation of public water supplies will be instituted in Curico, Chile. The project will be conducted by the School of Public Health, College of Dentists of Chile, and will be sponsored by the Rockefeller Foundation, reports Raúl Muñoz Inza of Santiago, president of the College.

NEW VERACRUZ DENTAL SCHOOL ANNOUNCES FUTURE PLANS

The Faculty of Dentistry, University of Veracruz, Mexico, opened in the fall and is now completing its first term, according to a recent announcement from Moises Quiroga, dean. The school's curriculum, patterned after that of Mexico's National Dental College, is limited to studies of the freshman year. Second year classes will commence next year.

AUSTRALIAN DENTAL SOCIETY ENDORSES FLUORIDATION

The Australian Dental Association recently endorsed the finding of its National Health and Medical Research Council that the addition of fluorides to water supplies is a "reasonable and safe measure" to be carried out under strict supervision and scientific control.

The 1952 officers of the Australian Dental Association were re-elected for 1953. They are: J. V. Hall Best, president; K. Adamson, vice-president; J. M. Wark, interstate vice-president; N. E. Edney, honorary secretary, and A. G. Rowell, honorary treasurer.

Dental Education

AMERICAN ASSOCIATION OF DENTAL SCHOOLS TO MEET

General sessions on the teaching of periodontology and on a visual training course will highlight the thirtieth annual meeting of the American Association of Dental Schools, to be held March 22-25 at the Benjamin Franklin Hotel, Philadelphia.

The periodontology program will be presented by a committee appointed last year by the A.A.D.S. Committee on Teaching; it will include discussions of objectives, trends, methodology, integration with basic sciences and postgraduate instruction in periodontology.

The visual training course developed at Ohio State University for dental students will be the subject of a lecture and demonstration by two fine arts teachers. Development of visualization and motor skills critical to operations in dentistry will be stressed.

Conference sessions will also be presented on clinic administration, crown and bridge prosthesis, dental hygienist education, full denture and partial denture prosthesis, graduate study, operative dentistry, oral diagnosis, oral surgery and pedodontics.

Maynard K. Hine of Indianapolis will succeed Wendell D. Postle of Columbus as president of the A.A.D.S. at the closing business session March 25. Information on the program may be obtained from Marion W. McCrea, secretary treasurer of the A.A.D.S., Baltimore College of Dental Surgery, University of Maryland, Baltimore 1.

NEW DENTAL DEAN APPOINTED AT NEW YORK UNIVERSITY

Raymond J. Nagle of Boston, president of the New England Association of Dental Examiners, became dean of the College of Dentistry, New York University, on February 1. He succeeds Claus F. Hinck, Jr., who has served as acting dean since the death of Walter H. Wright in December 1951.

Dr. Nagle is chairman of the Massachusetts State Board of Dental Examiners and a member of the committee on establishing a medical and dental school for the University of Massachusetts. He is president-elect of his state dental society, a VA and Selective Service consultant, a diplomate of the American Board of Prosthodontics, associate editor of the *Journal of Prosthetic Dentistry* and a staff member of Boston City Hospital.

Dr. Nagle received his dental degree from Harvard University Dental School in 1924 and joined the faculty in that year, becoming director of the complete denture department in 1938.

TWO GRADUATE COURSES IN ORTHODONTICS ANNOUNCED

Two dental schools, the University of Toronto Faculty of Dentistry and the University of Washington School of Dentistry (Seattle), are now receiving applications for graduate courses in orthodontics.

At the University of Toronto, March 2 will be the deadline for applying for the graduate orthodontics course which begins September 1, 1953, and continues for a period of 17 months. Enrollment will be limited to six graduates of approved dental schools who possess the scholastic standing required for studies leading to a Master of Science (Dent.) degree. Inquiries may be addressed to the dean, Faculty of Dentistry, University of Toronto, 230 College Street, Toronto, Ontario, Canada.

At the University of Washington (Seattle), the next graduate class in orthodontics will begin the latter part of

September 1953 and will lead to a Master of Science degree or to a certificate. Information may be obtained by writing to the director of graduate dental education, University of Washington, School of Dentistry, Seattle 5.

DENTAL SCHOOLS ANNOUNCE NEW POSTGRADUATE COURSES

Columbia • A course on the physiological basis of dental practice will be given during the week of May 25 at the School of Dental and Oral Surgery of Columbia University by L. Laszlo Schwartz and Barnet M. Levy.

The physiology of the masticatory system will be described through lectures, clinical and laboratory demonstrations and seminars in cooperation with the University's medical center. Enrollment is limited.

Further information may be obtained by writing to Barnet M. Levy, director of the postgraduate division, School of Dental and Oral Surgery, Columbia University, 630 West 168th Street, New York 32.

Georgetown • Courses to be presented during the coming month at Georgetown University School of Dentistry include:

Applied and surgical orthopedic anatomy, February 9-March 9; advanced operative dentistry embracing airbrasive, February 9-13; management of dental practice, February 27-28.

Further information concerning postgraduate courses may be obtained by writing the secretary, postgraduate courses, Georgetown University School of Dentistry, 3900 Reservoir Road, N. W., Washington, D. C.

Kansas City • Twelve postgraduate courses will be presented during the coming term by the University of Kansas City School of Dentistry. Eleven of the courses will precede or follow the School's alumni meeting to be held March 9-10. The courses and their instructors include:

Oral surgery, by Henry B. Clark, Jr., March 6-7; operative and preventive dentistry, Joseph F. Volker, March 6-7; oral pathology and diagnosis, Lester W. Burket, March 6-7; chairside assistants' program, George E. Waterman, March 11-12; full denture prosthesis, LeRoy E. Kurth, March 11-13; pedodontics, Herbert L. Hayward and William P. Humphrey, March 11-14; fixed crown and bridge prosthesis, Stanley D. Tylman, March 11-12; precision bridgework, John E. Gossett, March 13-14.

Airbrasive technic, Carl W. Sawyer, March 11-13; periodontics, B. O. A. Thomas, March 16-17, and head and neck anatomy, James E. Herbertson, July 20-24.

In addition to the above courses for dentists, a postgraduate course in dental hygiene will be offered March 2-6.

Further information may be obtained by writing to Joseph F. Jacobs, director, postgraduate division, University of Kansas City School of Dentistry, 1108 East Tenth Street, Kansas City 6, Mo.

Northwestern • A postgraduate course on functional occlusion of the teeth will be presented by Northwestern University Dental School April 1-3, 1953.

The course is designed particularly for dentists in general practice; attendance will be limited to 75. The faculty will consist of: Henry Beyron and Gosta Lindblom of Stockholm, Sweden; Ernest Granger of Mt. Vernon, N. Y.; Harry Sicher, Stanley Harris and John R. Thompson of Chicago.

Further information and application forms may be obtained from The Dean, Northwestern University Dental School, 311 East Chicago Avenue, Chicago.

Ohio State • Ten postgraduate courses will be presented this spring by the College of Dentistry, Ohio State University. The courses, listed with dates and instructors, are:

Crown and bridge, March 30-April 3, Frank C. Starr; general anesthesia, April 6-10, Morgan L. Allison; oral pathology and diagnosis, April 13-17, H. B. G. Robinson; airbrasive technic, April 27-May 1, John B. Bowers and Robert T. Trippy; oral surgery, May 4-8, D. P. Snyder; periodontics, May 11-15, John R. Wilson; partial denture prosthesis,

May 11-15, Victor L. Steffel; full denture prosthesis, May 18-22, Carl O. Boucher; anatomy of the head and neck, June 15-19, Linden F. Edwards, and endodontics, May 18-22, Henry J. Kaiser.

Each course is presented five consecutive days, Monday through Friday. Enrollment is limited.

Further information and applications may be obtained from the postgraduate division, College of Dentistry, Ohio State University, Columbus 10, Ohio.

Toronto • Five continuation courses for graduates in dentistry will be presented during March, April and May by the University of Toronto Faculty of Dentistry.

A course on dental caries (etiology and prevention) will be presented March 5-6 by G. Nikiforuk; endodontics will be presented March 9-13 by G. C. Hare and Louis I. Grossman; orthodontics, April 13-17 by Robert E. Moyers; dental oral surgery and anesthesia, April 27-May 1 by J. H. Johnson, and periodontics, May 4-8 by H. K. Box and C. H. M. Williams. All courses are designed for the general practitioner; enrollment will be limited.

Inquiries may be addressed to the dean, Faculty of Dentistry, University of Toronto, 230 College Street, Toronto 2-B, Ontario.

Tufts • A full-time postgraduate course in prosthetics will be presented by Tufts College Dental School during the school year of October 1953 through June 1954.

The course, under the direction of Irving R. Hardy, will consist of didactic instruction, clinical demonstrations and practical work by the participants in full and partial denture prosthesis. The class will be limited to six.

Further information and application forms may be obtained from the director of graduate and postgraduate studies, Tufts College Dental School, 136 Harrison Avenue, Boston.

Public Health

VA ADDS DENTAL SUPERVISORS TO AREA OFFICE STAFFS

A dental supervisor has been assigned to each of the Veterans Administration's six area medical offices, it was recently announced by Vice Admiral Joel T. Boone, chief medical director of the VA. The dental supervisors assumed office January 1.

Under the new organization VA dental service will have field supervision similar to that of VA medical service, states John E. Fauber, assistant chief medical director for dental service.

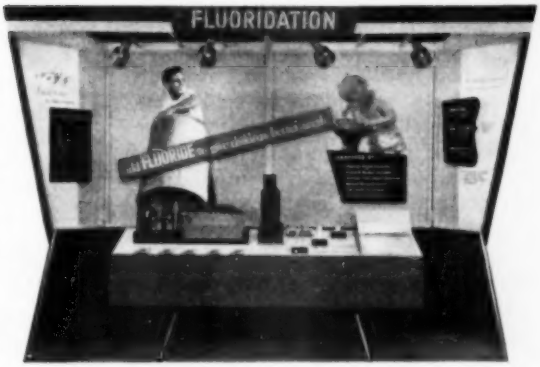
The new dental supervisors and their area offices are:
M. Dee Medlin, Boston;
Harry R. Voekler, Washington, D. C.;
Stanton N. Bordner, Atlanta, Ga.;
Edward Neenan, St. Louis;
Willis E. Krueger, St. Paul, Minn.;
Walter Lee, San Francisco.

VA area offices have not had dental supervisors since the agency's 13 branch offices were abolished and the six area medical offices were created in 1949.

A.A.A.S. DENTAL SECTION RECOMMENDS FLUORIDATION

Water fluoridation was strongly endorsed by the dental section of the American Association for the Advancement of Science during the recent national meeting of the A.A.A.S. Russell W. Bunting, secretary of the section on dentistry (Nd), reports that the following resolution was adopted:

Be it resolved that section Nd of the American Academy for the Advancement



The new fluoridation exhibit of the United States Public Health Service was shown at the recent meeting of the Association of State and Territorial Health Officers in Washington, D.C. The counter in front has an animated fluoridation plant to the left and an instrument on the right which shows how the fluoride content of water is determined. In the background, to the left is calculated the cost of installing fluoridation equipment and to the right is tabulated the estimated annual cost of fluoride compounds.

of Science, convened in annual session in St. Louis, December 27, 1952, strongly endorses the fluoridation of city water supplies as a partial preventive of decay of the teeth of children and recommends that all cities and communities having a central water supply adopt this health measure.

USPHS TO HOLD EXAMINATION TO FILL DENTAL POSTS

Competitive examinations for the appointment of dental officers in the United States Public Health Service will be conducted April 7-9 at various points throughout the United States. The examination will consist of oral, physical, written and practical tests. Completed application forms must be received by the U. S. Public Health Service no later than February 24.

Appointments will be made in the grades of assistant dental surgeon (equivalent to the Navy rank of Lieutenant, j.g.) and senior assistant dental surgeon (equivalent of Lieutenant).

Candidates must be citizens of this country, at least 21 years old and graduates of an approved dental school. Those who have at least 10 years of collegiate and professional training and experience are eligible for the post of senior assistant. Those with at least seven years of collegiate and professional training and experience are eligible for the post of assistant dental surgeon.

Application forms may be obtained from the chief of the Division of Commissioned Officers, Public Health Service, Federal Security Agency, Washington 25, D.C. Completed forms received in the Division after February 24 will not be accepted.

FORM SOCIETY FOR DENTISTS IN REHABILITATION WORK

A national organization for dentists interested in or active in fabricating obturators, artificial eyes, implants or other prostheses will be formed at a meeting to be held during the Midwinter Meeting of the Chicago Dental Society, it has been announced by A. C. Fonder, secretary-treasurer of the Rehabilitation Institute of Chicago.

The National Association for Somatoprosthetics will be organized at an open meeting at 1:30 P.M., February 9 in Room 20 of the Conrad Hilton Hotel, Chicago. Inquiries may be addressed to Dr. Fonder at the Rehabilitation Institute, 123 West Madison Street, Chicago.

PITTSBURGH INAUGURATES FLUORIDATION PROGRAM

More than 700,000 persons in Pittsburgh and adjacent communities are now receiving fluoridated drinking water. The fluoridation program was authorized by the City Council in 1950; its introduction was credited to an advisory committee of dentists appointed by the department of health to study the measure and to formulate and promote a program.

Members of the advisory committee were Lawrence E. Van Kirk, W. Earle Craig, W. D. McClelland, Milton E. Nicholson and Isaac Sissman. Gerald Cox served as a committee consultant.

NATIONAL BOARD OF P.T.A. ENDORSES FLUORIDATION

At a recent meeting of the National Congress of Parents and Teachers Board of Managers, fluoridation received a unanimous recommendation "as a means of materially reducing the high incidence of dental caries among children." Several state P.T.A. organizations which already had recommended the measure asked to have the support of their national association in the campaign for fluoridation.

Henry F. Helmholz, M.D., national chairman of the Congress' committee on health, has asked state health chairmen of the P.T.A. to communicate with their state dental societies in order to organize active cooperation in the campaign at the state level.

INDUSTRIAL DENTISTS TO MEET APRIL 21-23

The tenth annual meeting of the American Association of Industrial Dentists will be held during the Industrial Health Conference, April 21-23 at the Hotel Statler, Los Angeles.

The industrial dentists will tour a large industry where a dental program is in operation. The sessions of the meeting will be open to all interested dentists, it has been announced by Edward R. Aston of Harrisburg, secretary.

Further information may be obtained from Dr. Aston, Pennsylvania Department of Health, 1400 North Cameron Street, Harrisburg, Pa.

CHILDREN'S DENTAL CLINICS IN CLEVELAND AWARDED FUNDS

Grants totaling $30,000 were awarded recently to Western Reserve University's Dental Research Center, Cleveland. A total of $10,000 was awarded to the Children's Dental Clinic, and $20,000 was awarded for the establishment and initial support of a dental clinic to be conducted within Babies' and Children's Hospital for the treatment of children affected with cerebral palsy. The grants were made from the Harry Coulby Fund and were distributed by the Cleveland Foundation.

General

PARALYZED DENTIST, FAMILY SURVIVE BULBAR POLIO

The Council on Relief recently circulated to all Association members an account of the tragic polio outbreak in the family of Thomas Michiels, 31 year old dentist who had just bought a practice in Park Ridge, Ill., and was planning to move to the town with his wife and three small boys.

Readers of THE JOURNAL will be interested to know that Dr. Michiels, his wife and five year old son, all of whom were stricken with bulbar polio last October, have survived. Dr. Michiels and his wife are paralyzed and are in iron lungs; it is thought that he will never be able to practice dentistry again. Five year old Robert has been released from the hos-

pital and can walk with the aid of braces. Two younger children, William, 3, and Dennis, 1, escaped the disease.

Dr. Michiels had used all of his savings to buy his practice in Park Ridge last August. When he and his family became ill, neighbors supplemented the emergency relief fund of the Chicago Dental Society, of which Dr. Michiels is a member. The citizens of Park Ridge have established a trust fund of $10,000 for the three sons.

SOCIETY TO HEAR NEUROLOGICAL SURGEON

"The Brain in General Anesthesia" will be discussed by an eminent medical educator at the next meeting of the American Society for the Advancement of General Anesthesia in Dentistry. Frederic Schreiber of Detroit will be the guest speaker at the meeting, which is to be held March 23 at the Shelburne Hotel, New York. Dr. Schreiber, a physician, is clinical professor of neurological surgery at Wayne University Medical School, Detroit.

The discussion will be opened by E. A. Rovenstine, professor of anesthesia and chairman of the department, New York University Medical School. Further information may be obtained from M. Hillel Feldman, executive secretary of the Society, 730 Fifth Avenue, New York.

ACADEMY OF DENTAL MEDICINE TO DISCUSS NUTRITION

Nutrition will be discussed at the seventh annual meeting of the American Academy of Dental Medicine, to be held June 26-28 at the Hotel Shoreham in Washington, D. C. The program of lectures and round-table discussion will be open to all physicians and dentists who wish to attend.

Arrangements also will be made for sightseeing and entertainment. Details of the program and reservations may be obtained from William M. Greenhut, national secretary of the organization, 124 East 84th Street, New York 28.

UNIVERSITY OF MARYLAND DENTAL ALUMNI TO MEET

The largest alumni meeting in the history of the Baltimore College of Dental Surgery, University of Maryland, will be held March 4-6 in Baltimore, it was recently announced. The three-day program of

Shown at a luncheon honoring Harlan H. Horner (left) on the publication date of his new book, "Lincoln and Greeley," are Ralph Newman, owner of the Abraham Lincoln Book Shop, Chicago; Lon W. Morrey, editor of The Journal, and Miodrag Muntyan, director of the University of Illinois Press. Dr. Horner, former secretary of the Council on Dental Education of the Association, was commended by literary editors of Chicago newspapers for a "sound, well written and documented" study and "a genuinely valuable contribution to the study of our past."

scientific sessions, class reunions, entertainment and school tours will be climaxed March 6 with a dinner in honor of J. Ben Robinson, retiring dean.

Speakers scheduled to address the alumni meeting include Frank J. Houghton, dean of the Loyola University (New Orleans) School of Dentistry; Harry B. McCarthy, dean of the Baylor University College of Dentistry; H. C. Byrd, president of the University of Maryland; Harry Levin, president of the National Alumni Association; the deans of the School of Medicine and the School of Pharmacy, and Dr. Robinson.

Scientific sessions will be presented in six sections on the afternoons of March 4 and 6, with 12 alumni participating as essayists. The program has been arranged under the direction of George M. Anderson and Myron S. Aisenberg.

Inquiries about the meeting may be addressed to Gardner P. H. Foley, 618 W. Lombard Street, Baltimore 1.

TUFTS DENTAL SCHOOL PLANS JUNE BERKSHIRE CONFERENCE

The postgraduate division of Tufts College Dental School will hold its fourth annual Berkshire Conference in Periodontology and Oral Pathology June 14-18 in Lenox, Mass. The conference, to be conducted by Irving Glickman and staff, will consist of four days of lectures, seminars and panel discussions on clinical problems and will feature well-known medical and dental educators and clinicians.

The faculty of the conference will include Col. Joseph Bernier, Louis A. Cohn, Irving Glickman, Roger Guillemin, Lent C. Johnson, Donald Kerr, Paul Losch, Harry Sicher, I. Snapper and David Weisberger. Morning and evenings will be devoted to professional activities; afternoons will be open for recreation at the resort site of the conference.

INTERNATIONAL ACADEMY OF ORAL DYNAMICS TO MEET

The annual meeting of the International Academy of Oral Dynamics will be held on the afternoon of March 15 at the Shoreham Hotel, Washington, D. C., and will feature Gosta Lindblom of Stockholm, Sweden, as main speaker.

The meeting of the Academy will continue through March 18 in conjunction with the District of Columbia Postgraduate Clinic.

NORTHWESTERN DENTAL SCHOOL ANNOUNCES ALUMNI EVENTS

Northwestern University Dental School will present its annual alumni school day April 7 and its homecoming program April 8.

Three all-day courses—oral surgery and anesthesia, correction of occlusion and complete dentures—will be presented April 7. Reservations for any of these courses may be made by writing or telephoning Miss Merle Hunter, Northwestern University Dental School, 303 East Chicago Avenue, Chicago 11.

The homecoming program on April 8 will feature a morning session of table clinics presented by alumni, faculty and graduate students, and an afternoon session of essays and a general meeting honoring the class of 1903. A complimentary luncheon will be served in the clubroom at noon.

NEW JERSEY STATE BOARD SCHEDULES EXAMINATIONS

Clinical examinations in dentistry will be administered by the New Jersey State Board of Registration and Examination in Dentistry June 1 and 2 at the University of Pennsylvania, Philadelphia, and on June 10 and 11 at Columbia University, New York. Written examinations will be given June 3-5 at Trenton.

Examinations in dental hygiene will be administered June 1 and 2 at the University of Pennsylvania.

Further information may be obtained by writing to W. A. Wilson, secretary, State Board of Registration and Examination in Dentistry, 150 East State Street, Trenton 8, N. J.

FLORIDA DENTAL EXAMINERS ANNOUNCE JULY EXAMINATIONS

The Florida State Board of Dental Examiners will test applicants for Florida licenses July 6-14, 1953, at the Seminole Hotel, Jacksonville, Fla. Dentists must file preliminary applications by May 6 and final applications by June 6.

Examinations for dental hygiene licenses will also be held July 6-14; dental hygienists must complete applications by June 6.

Communications may be addressed to A. W. Kellner, secretary-treasurer, Florida State Board of Dental Examiners, P. O. Box 155, Hollywood, Fla.

ILLINOIS DENTAL ALUMNI PLAN FEBRUARY 11 LUNCHEON

The annual luncheon of the University of Illinois Dental Alumni Association will be held at noon February 11 in the South Ballroom of the Conrad Hilton Hotel, Chicago.

Arthur Marc of Chicago, newly-installed president of the Association, will preside at the luncheon program, which will be held in conjunction with the 1953 Midwinter Meeting of the Chicago Dental Society.

Headquarters for dental alumni of the University of Illinois will be Room 556A of the Conrad Hilton Hotel. Reservations for the luncheon may be addressed to Arthur Marc, 5 South Wabash, or Mrs. Frances McGinn, University of Illinois College of Dentistry, Chicago.

T. P. HYATT, DENTAL LEADER OF PAST DECADES, DIES

Thaddeus P. Hyatt, internationally known exponent of preventive dentistry and originator of prophylactic odontotomy, died recently at the age of 88.

As dental director of the Metropolitan Life Insurance Company during 1915-1936, Dr. Hyatt was one of the first to compile statistics on dental needs and to formulate national programs to educate the public on dental health. He also was a leader in promoting industrial dentistry.

T. P. Hyatt

In 1923 he originated prophylactic odontotomy, advocating the widening and filling of deep, narrow fissures in the teeth to prevent decay. The measure was subsequently advocated by more than 40 national and international dental societies.

In 1927 Dr Hyatt and several others formed the American Society of Dentistry for Children. During 1928 he assisted the dental division of the New York City Health Department in reorganizing the dental service in elementary schools. He also served for many years as professor of preventive dentistry at New York University School of Dentistry, from which he had been graduated in 1889.

Dr. Hyatt received the New York University alumni medal in 1933 and the Jarvie medal of the New York State Dental Society in 1934.

PAN-AMERICAN DENTAL GROUP TO DISTRIBUTE TEACHING AIDS

Teaching models and equipment presented to the Pan American Odontological Association at its sixteenth annual meeting in December will be given to various dental schools of Central and South America, it was announced by Ralph Howard Brodsky of New York, newly-elected president of the society.

The recipients of the teaching aids have been chosen in consultation with Latin American consular representatives. The equipment was donated by the Columbia Dentoform Corporation of New York.

In addition to Dr. Brodsky, newly-elected officers of the Pan American Odontological Association are Lester W. Burket of Philadelphia, president-elect; Bissell B. Palmer of New York, executive secretary; Samuel C. Miller of New York, H. P. Hurlong of Arden, Del., and Cyril D. Marshall-Day of Boston, vice-presidents; H. Justin Ross of New York, treasurer.

PENNSYLVANIA ALUMNI TO OBSERVE SCHOOL JUBILEE

A scientific session will be presented during the 75th Jubilee Celebration of the University of Pennsylvania School of Dentistry, to be held June 11-12. Essayists who will present papers include: George M. Hollenback of Sherman Oaks, Calif.; Ernest B. Nuttall of Baltimore; Lewis I. Fox of South Norwalk, Conn.; Leslie M. FitzGerald of Dubuque, Iowa, and Roy G. Ellis of Toronto, Canada.

The women's program will include a tea, it has been announced by Mrs. Lester W. Burket, chairman of the women's committee. Alumni wives have also been invited to the annual banquet of the Alumni Society.

Also . . . A grant of $12,000 has been awarded the American Public Health Association by the W. K. Kellogg Foundation to enable the Association to prepare and publish a manual of local health administration. . . . The ninth annual post-college assembly of the Ohio State University will be held April 22-23. Although the meetings have been arranged especially for Ohio State alumni, they are open to all dentists. Information on the program may be obtained from the College of Dentistry, Ohio State University. . . . The annual Cincinnati Clinic will be held March 22-24. . . . The findings and recommendations of the President's Commission on the Health Needs of the Nation will be evaluated at the annual meeting of the National Health Council, March 18-20 at the Hotel Roosevelt, New York City. . . . Louis A. Cohn has been appointed associate professor of postgraduate prosthetics at Tufts College Dental School. Dr. Cohn will also continue his teaching activities at Columbia University dental school. . . . The new School of Dentistry at the College of Medical Evangelists, Loma Linda, Calif., will accept 48 students when it opens in September. The admissions committee of the School met January 4 for the first time, according to M. Webster Prince, dean.

Cases and Comments

A SIMPLE INLAY TECHNIC FOR DECIDUOUS MOLARS

By H. Vernon Reed, D.D.S., Memphis, Tenn.

Despite the great amount of dental health education provided the public by the profession with the assistance of teaching institutions, health agencies, the press, radio, television and other mediums, many parents still do not realize the importance of properly caring for their children's deciduous teeth. The following illustrations will aid the dentist to inform parents why early, regular and thorough dental care for the child, beginning at no later than three years of age, will help preserve the deciduous teeth in a vital condition and, many times, prevent long and costly orthodontic treatments later. With the aid of these illustrations and with the use of models and roentgenograms, the dentist usually can make parents realize the advantages of gold inlays in restoring the deciduous teeth to normal usage.

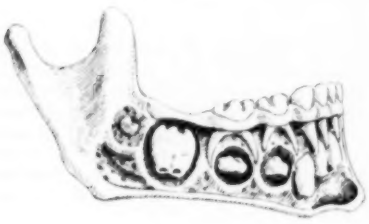


Figure 1 • The first permanent molars usually erupt when the child is about six years of age. If the deciduous molars are badly decayed or prematurely lost, the first permanent molars tend to tip forward out of normal position. This malposition causes the other permanent teeth to come in crooked. To remedy this condition, orthodontic appliances may have to be placed on the teeth in order to move the first permanent molars and other malposed teeth back into proper position.

Figure 2 • Decay frequently attacks the interproximal surfaces of the deciduous molars. Early, frequent and thorough examination of these teeth usually enables the dentist to detect incipient caries before much tooth structure is lost. Early detection of small cavities, removal of decay and the insertion of a permanent filling will help preserve these deciduous molars until their normal shedding time which is when the child is from 9 to 11 years old.

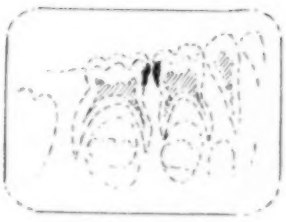


Figure 3 • Few dentists are content with an ordinary mouth mirror and explorer examination of the child's deciduous teeth. Frequently this type of examination does not enable the dentist to discover some decay in its earliest stages. It is advisable to supplement the clinical examination of the teeth with a complete roentgenographic examination as roentgenograms disclose caries not otherwise detectable. This illustration is a reproduction of a roentgenogram showing interproximal decay.

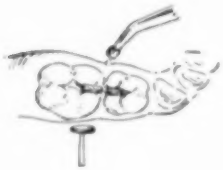


Figure 4 • It is a simple matter to remove the decay, prepare the cavities and restore these teeth to usefulness by the insertion of gold inlays. With a small diamond wheel stone inserted in either a straight handpiece or a contra angle handpiece, a groove is cut in the occlusal surface of both teeth. The stone is cooled with water and a cut is made through the enamel into a self-cleansing area in the dentin.

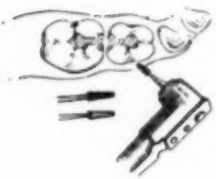


Figure 5 • With a diamond stone or a no. 559 carbide bur, the interproximal steps are cut in box form. Because most children gag easily they usually prefer the sharp cutting carbide burs with air rather than with water. The boxes are cut as shallow as possible and the occlusal grooves are straightened. The gingival margin is opened with a hook scaler. All decay need not be removed at this time but the margins must be free of decay and no undercut should be present.

Figure 6 • A piece of inlay wax is warmed and pressed firmly into both of the interproximal cavities with the thumb. The patient is asked to close the teeth and then to move the jaws sideways, forward and backward. This movement must be done carefully to obtain approximate occlusion without distorting the wax. All of the excess wax is carefully trimmed off.

Figure 7 • The wax is cut into two separate patterns by passing a piece of matrix band material between the two teeth.

Figure 8 • The occlusal surface of the wax pattern is carved.

Figure 9 • The margins of the wax patterns are carved and trimmed.

Figure 10 • The wax is adapted to the margins of the cavities by means of linen strips.

Figure 11 • A paper clip is notched. The clip is warmed and the two free ends are inserted in the patterns. The patterns are chilled and removed and the clip is broken apart so that either pattern can be replaced and readapted.

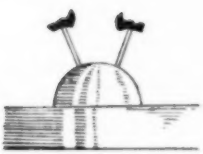


Figure 12 • The inlays are invested, cast and polished and then set with red copper cement. Prior to setting, any remaining decay is removed with small sharp spoons. If sharp carbide burs, new diamond stones and sharp spoons are used, a local anesthetic usually is not necessary.

608 Medical Arts Building

Current Literature

AN APPRAISAL OF VARIOUS METHODS EMPLOYED TO ANALYZE THE CLINICAL EFFECTIVENESS OF CARIES-INHIBITORY AGENTS

John W. Fertig and Neal W. Chilton. Am. J. Pub. Health 42:825, July, 1952.

The testing of the clinical effectiveness of methods proposed as caries-inhibitory agents is most important in the final evaluation of their application. It is essential that the investigator set up his study in such a manner that the results as reported can be evaluated properly.

Two studies by well-known, reliable workers in dental research are developed statistically and appraised critically on their statistical method of reporting only. They illustrate the two-group study and the one-group study.

In the former (two-group study), the effect of the test agent can be evaluated by comparing the average number of newly decayed teeth in the two groups. In the one-group study, the effect of the test agent can be evaluated in terms of the average difference in number of attacked teeth on the two sides of the mouth.

The conclusion after careful study is that in either type of study, while the average attack rate may be readily computed from pooled data on initially free and on attacked teeth, the significance cannot be measured safely from these pooled data. The practice of quoting differences in average numbers of attacked teeth or of attack rates as relative reductions is correct but it may also be misleading.

H. S. Dwyer

THE APPLICATION OF THE EDGEWISE ARCH MECHANISM TO THE TWEED PHILOSOPHY IN ORTHODONTICS

B. L. Herzberg. Am. J. Orthodont. 38: 506, July, 1952.

Tweed has aptly said that if orthodontists know their goal, they will be able to devise a means for attaining it. Those who follow the Tweed philosophy and use the edgewise arch mechanism have a definite plan or routine to follow in therapy. If the lower incisors are not over the base, they must be placed there in treatment; if they are over the base, they must be so maintained. If more mandibular anchorage is desirable or required, the incisors along with all the lower cuspids and buccal teeth must be tipped back, the buccal segments distally and the labial teeth lingually.

Orthodontists attempt to complete orthodontic treatment with end-to-end incisal relationships, not knowing just where the anterior overbite should be but knowing full well that each case will settle and the overbite will stay the same or will increase a little or even a great deal. Beyond this they have little or no control over the anterior overbite. They try to seat cusps rather precisely and, above all, to finish cases with the lower incisors relatively upright to the base.

From among hundreds of cases, two were selected, one of nonextraction and the other of extraction (four first bicuspids) in order to present merely a sample of the results which are attainable daily for the large number of orthodontists who follow the Tweed teachings in orthodontics.

William F. Ford

OCCLUSAL EQUILIBRATION—A PART OF ORTHODONTIC TREATMENT

Jacoby T. Rothner. Am. J. Orthodont. 38:530, July, 1952.

In the last half century, life expectancy has been extended some twenty-five years in man's favor; it now behooves the orthodontist to extend this favor still further by helping man retain his teeth during this additional span of years. Man's teeth should last his lifetime; it is the duty of every dentist to keep this in mind and to strive as a healer to see that this axiom is made effective.

The orthodontist with the means at his command can adjust the irregularities of tooth alignment and thus make for a better occlusal relationship. It is not enough that he obtain a good esthetic appearance of the mouth. He should strive to obtain also a so-called harmonious occlusion; and he must check further to make sure that a good functional occlusion has been established, that is, that the proper occlusal harmonics exist. The periodontist, concerned as he must be with the protection and health of the supporting tissue, will adjust occlusal stresses to protect these structures.

If the orthodontist will consider these facts

and make the necessary corrections, he will be able to render a far better service to his patients and to eliminate some of the heartaches he encounters. The correction of occlusal factors should be a part of orthodontic treatment; the periods of retention may be shortened in certain cases; future periodontal troubles must be prevented. Prevention is the keynote of dentistry today.

William F. Ford

JOURNAL OF DENTAL RESEARCH
October 1952

EFFECTS OF TOTAL BODY X-RADIATION ON SALIVARY COMPONENTS OF DOGS

J. L. Nemes, M. G. Wheatcroft and R. S. Leopold, p. 603.

THE EFFECT OF LOCAL X-RAY IRRADIATION UPON THE TEETH AND SURROUNDING TISSUES IN YOUNG AXOLOTLS (SIREDON MEXICANUM)

V. V. Brunst, E. A. Sheremetieva-Brunst and Frank H. J. Figge, p. 609.

The teeth in the lower jaws of young axolotls (20, 22 and 60 days after hatching) were irradiated with 2,000 to 4,000 r. The conditions of irradiation were as follows: 55 kv., 3 ma. max., no filter. On the day of treatment, some teeth were present even in the younger animals. Animals which were irradiated 60 days after hatching had well developed teeth.

The enamel epithelium in the treated teeth disappeared, and mitotic activity in the surrounding tissue was completely suppressed. Twenty-three days after treatment in the irradiated jaws, development of the teeth was suppressed completely, and the typical degenerating giant cell oral epithelium was observed. Thirty-four days after irradiation of 20 day old axolotls with 4,000 r and 43 days after irradiation of 60 day old axolotls with 3,000 r, only small remnants of teeth were observed. About 15 days later, all remnants of the teeth had disappeared. Once the irradiated teeth had disappeared, no formation of new teeth was ever observed, not even a year after irradiation.

The mechanisms of tooth formation and tooth maintenance are permanently destroyed by 2,000 to 4,000 r doses of roentgen-ray irradiation.

X-RAY CRYSTALLOGRAPHIC EXAMINATION OF CALCULI FROM SALIVARY GLANDS

Aksel Tovborg Jensen and Marianne Dano, p. 620.

Twenty-six surgically removed calculi were examined by a high-dispersion roentgen-ray powder method. Twelve calculi contained only colloidal apatite; two, only colloidal whitlockite; 12, mixtures of apatite and whitlockite. Two calculi contained traces of calcite also. Whitlockite is extremely rare in calcium phosphates deposited in the body. Hence, it is concluded that the saliva often, perhaps always, contains a factor which impedes the normal crystallization of apatite.

AN ARTIFICIAL MOUTH FOR CARIES RESEARCH

Ward Pigman, Howard C. Elliott, Jr., and R. O. Lafire, p. 627.

A new type of apparatus has been developed for use in *in vitro* studies of dental caries. For experiments with the apparatus freshly extracted teeth were mounted in Kerr compound in acrylate boxes. The sterile bacteriological medium was allowed to flow dropwise onto the surface of the teeth and to drain off. Inoculations were made weekly with samples of freshly pooled saliva.

Ten teeth were left in the artificial mouth for eight weeks. They rapidly became covered with a mass of bacteria. While some general decalcification resulted, there were appreciable local differences; pitting into the dentin also was noticed. Previously abraded areas seemed particularly susceptible to attack. The general decalcification was ascribed to lack of mechanical cleansing factors.

MANGANESE ANTAGONISTS IN THE NUTRITION OF LACTOBACILLUS ACIDOPHILUS

Warner W. Carlson, Louis V. Farina and Virginia Whiteside-Carlson, p. 634.

For a typical oral lactobacillus, *L. acidophilus* 4646 (ATCC), it was found that manganese ion was highly stimulatory in the concentration range of 1 to 10 micrograms per ml.; magnesium ion failed to enhance growth. Various chelating agents capable of complexing manganese were investigated for bacteriostatic effects against *L. acidophilus*. Sodium citrate inhibited growth of the organisms when incorporated into the medium at levels of 0.1 to 0.5 Gm. per cent; the inhibition was reversed readily by the addition of manganese, but not of magnesium. The sodium salt of ethylenediamine tetracetic acid was ap-

proximately five thousand times more effective than sodium citrate, and completely inhibited growth at a level of 0.1 mg. per cent; the inhibition could be reversed by the addition of manganese. The growth-inhibitory effect of potassium fluoride did not appear to be related to the formation of a manganese-fluoride complex.

THE INFLUENCE OF THE ENAMEL ORGAN UPON THE CALCIFICATION OF DENTIN AND THE FUNCTIONS OF THE ODONTOBLASTS

J. T. Irving, p. 639.

Enamel hypoplasia in rats was produced experimentally by subjecting them first to a rachitogenic diet, then for three to six days to a correct diet which allowed a period of healing and again to the rachitogenic ration. From three to 42 days later the animals were sacrificed, and the incisor teeth were examined histologically. It was found that the influence of the enamel organ not only controls differentiation of the odontoblasts, but is operative on their subsequent functions and maintenance as follows:

1. In the absence of enamel matrix formation in rats' incisor teeth, calcification of the corresponding dentin does not occur.

2. The odontoblasts corresponding to the uncalcified dentin lose their characteristic appearance about 18 days after calcification should have occurred and lay down less dentin matrix in which they have become embedded.

3. It is concluded that a stimulus to cause dentin calcification is received by the odontoblasts from the enamel organ at the time that enamel matrix is first formed. The effects of this stimulus persist throughout the life of the cell. In the absence of the stimulus, the odontoblasts can continue to lay down matrix for about 18 more days, after which they regress.

Book Reviews

THE ORIGIN OF LIFE AND THE EVOLUTION OF LIVING THINGS—AN ENVIRONMENTAL THEORY

By Olan R. Hyndman. 636 pages. Price $8.75. New York, Philosophical Library, 1952.

An Hebraic prayer begins with the query, "What is Man, Oh Lord, What is Man?" After reading this book, the reader will have at least one conceivably sound answer to this question. The answer offered by Dr. Hyndman not only applies to man, but to all forms of life.

The author does not repeat what has been taught so often, that the jigsaw puzzle of man has been pieced together from the chemicals found in the organism. He discusses first, why we have these chemicals, how the combinations came about and finally, why this process was possible here on earth under the influence of an environment of forces peculiar to our earthly set-up. There is really nothing new in this theme; Dr. Hyndman has eruditely corralled known facts of chemistry, physics and biology and tied them up to explain this point of view.

Notwithstanding the voluminous literature which states that we have a morphogenetic pattern and that this will pass on to successive generations unless a chance mutation occurs, the facts contained herein show that any and all living beings possess adaptive responses to an environment, that this is the reason for the morphologic sequences in living forms.

Very briefly, Hyndman presents the "germ integer" as the forerunner of all life. He describes its evolution to the cell and upward through differentiation to multicellularity, presenting finally a description of an organismal unit and the way in which the whole organism and its multitudinous parts retrace the life cycle of their forerunners.

This reviewer was impressed by the section on natural selection. Hyndman proves in a philosophical vein that any species of animal will not prey upon another, except to satisfy one drive, hunger. The general rule is that members of the species live with and protect one another and do not kill off weaker members. "Save in the unique case of man, the uniform instinct to protect and preserve the members of the animal's own specie is as evident as the instinct to prey upon another specie."

As the pendulum of scientific thought swings back and forth, I expect to hear a greater exposition of this theory and others like it from the lecture podiums of our dental and medical colleges.

Henry Rosen

THE PHOTOGRAPHY OF PATIENTS

By H. Lou Gibson. 118 pages with 93 illustrations, 4 in color. Index. Price $5.50. Springfield, Ill., Charles C Thomas, 1952.

It is difficult to find fault with this publication. Page after page is excellently written; description is adequate and detailed. Only the most critical analysis occasionally will indicate a possible change of lighting for correct texture. The second paragraph of page 63 is such an example. On page 91, the test for safelights could be improved if the photographic paper were developed in total darkness. These are minor corrections, however; the book is fundamentally sound, well illustrated and carefully prepared. It is highly recommended for individual or collective use.

Waldemar A. Link

A TRANSLATION OF GALEN'S HYGIENE (DE SANITATE TUENDA)

By Robert M. Green. 277 pages. Price $5.75. Springfield, Ill., Charles C Thomas, 1951.

This volume, the first English translation of an ancient work, will be of great interest to students of medical history, not only because it states the scientific and philosophic opinions of Galen, but also because it contains numerous quotations from his contemporaries in the fields of hygiene and medicine.

This particular work of Galen is concerned primarily with hygiene rather than with the diagnosis and treatment of diseases. After introductory chapters in which hygiene is defined and physical constitutional types are classified, the book proceeds to discussions of exercise, diet, massage and bathing, and finally, to the causes and treatment of the different types of fatigue. Many of the fundamental theories Galen expounded are those of Hippocrates; but the superstructure of rationale and treat-

ment is largely original and of later historical evolution.

It is particularly interesting to note Galen's constant emphasis on the principle of fitting the treatment to the individual needs of the patient. He was obviously a very artful physician, attempting always to achieve the desired effect without harm or discomfort to the patient, whether with massage, drugs or exercise.

In spite of the acknowledged complexity and obscurity of the original manuscripts of Galen, this translation is clear, interesting and readable.

Mary R. Richards

THE COST OF SICKNESS AND THE PRICE OF HEALTH

By C.-E. A. Winslow. World Health Organization Monograph Series no. 7. 106 pages. Index. Price $1.50. New York, Columbia University Press, 1951.

This is one of a series of monographs on world health conditions. It has to do with the organization of health services on local and national levels and includes information on costs for such services. It also deals with the cost of sickness, the interrelationship of poverty and disease, methods of reducing the burden of widespread disease and the economic results attained.

As in most instances when the World Health Organization deals with its special problems, little is said about the effect that the reduction of death rates will have in those overpopulated countries where the multitudes already are not properly fed. In those areas, there should be better co-ordination between health organizations and those agencies whose function is the increase of food production.

F. C. Cady

PATHOLOGICAL HISTOLOGY

By Robertson F. Ogilvie. Fourth edition. 506 pages with 295 illustrations, all in color. Index. Price $8. Baltimore, The Williams and Wilkins Co., 1951.

It is only rarely that there is produced the combination found in this volume—desirable subject matter at a price within the means of the average student.

It should be emphasized that the 295 colored illustrations in this book are reproductions of microphotographs collected by the author at the University of Edinburgh and the Royal Infirmary. In the study of stained sections of diseased tissues and organs it is most helpful to have colored slides for projection and textbook illustrations closely resembling the stained sections of the material in the hands of the students. The illustrations, two to a page, are reproduced on a finished, high grade paper and only one side of the sheet is used. All steps in making these illustrations have been done with remarkable excellence; the legends accompanying the illustrations are more than adequate and include the staining technic and the magnification.

The descriptive material is clearly presented; it is easily followed. Eighty-three pages are given to the presentation of general disturbances and inflammation; about the same amount of space to tumors, and the balance of the book to the diseases of the various body systems. The index is generous and a very satisfactory introduction to the book content because of the use of heavy and light faced numerals. There is no space assigned specifically to the oral cavity and the content relating to that part of the body is quite limited.

Students, their teachers and indeed all those who use the microscope in the examination of tissues should own and use this volume.

Edward H. Hatton

LEHRBUCH DER ANATOMIE FÜR ZAHNARZTE

By Georg Wetzel. Sixth edition. 723 pages with 692 illustrations. Index. Price not listed. Jena, Germany, Fischer, 1951.

This new edition of the standard anatomy textbook for German dental students and practitioners should be a valuable reference book for Americans.

Unlike the textbooks used by English-speaking students, the "Lehrbuch" presents its subject matter in an unprosaic and light style. Several aspects of anatomy are presented which give the reader a more lucid picture of the head and neck than he has had from previous studies. For example, there are several diagrams of cellular structures in three dimensional perspective.

Of tremendous value are the many footnotes which give the historical background and etymologic derivations of words used universally in anatomy. To round out the subject matter and to tie it in with specialties of dentistry such as orthodontics, the author presents the physical anthropologic aspects of the face, something not encountered in English texts.

One section of the "Lehrbuch" which is of extreme value, and not too clearly presented

in our texts, deals with the topography of the head and neck, pointing out the underlying structures. Another chapter which is both refreshing and different is that on the individual teeth and the whole denture. The American orthodontist will find a point of view on normal tooth position and arch formation which is worthy of consideration. The descriptive anatomy of each tooth is excellent.

Dr. Wetzel, definitely of the old German school of anatomists, seems to have ignored recent histologic studies. Most of his references are from the classical sources in anatomy. The authors quoted are predominantly German. American authors are noted only twice! Are we to believe that other sources of anatomic information do not exist?

For these reasons, this reviewer concludes that the sixth edition is a recapitulation of the first edition with changes in format instigated by a noted publisher. Even so, as a reference, this "Lehrbuch" should have wide usage in the United States, mainly because Dr. Wetzel's approach to anatomy is one we do not find in our texts.

It is interesting to note that Dr. Wetzel died recently at the age of 80. He should be remembered as the scientist who first used the methylene blue test for carbon monoxide in the blood.

Henry Rosen

X-RAY INTERPRETATION

By H. Cecil H. Bull. Second edition. 393 pages with 287 illustrations. Nine pages devoted to teeth with 6 illustrations. Price $5.50. New York, Oxford University Press, 1951.

This volume, written by an English author, is attractively presented from the literary point of view. It presents material on the entire skeleton with many illustrations of soft tissues. But as very little is recorded about the oral structures, the book contains little of value for the oral surgeon and for the dentist.

It is most unusual to find a text on this subject in which the terms roentgen ray, roentgenogram, roentgenography or roentgenology are rarely used, as in this volume. Instead the word "x-ray" is used throughout.

Many fine schematic diagrams illustrate what should be revealed in a roentgenogram of, for example, a fractured bone; but there is no roentgenogram of a fractured bone. In fact, there are no pictures in the entire book. A book on interpretation of roentgenograms with no roentgenographic pictures and no photographs falls short of serving as an aid in roentgenology. In teaching the undergraduate or even the practitioner how to read roentgenographic images, a book without pictures is of little value. Schematic drawings are of great value as an aid in teaching technic, but of no particular value in the interpretation of roentgenograms.

Lee Roy Main

DESIGN OF THE NATURAL DENTITION

By Horace Hayman Boyle. 126 pages with 53 illustrations. Index. Price $4.25. London and New York, Staples Press, 1952.

This book, the result of three theses written some time ago by a Scottish dentist, should be of interest to the close student of dentistry. It is pleasant and easy reading, consisting of chapters dealing with proportionate or mean dental dimensions and specific combined dental curvatures; general design in individual teeth; review of theories of occlusion of the teeth of man, including a new theory, and the functional design of the teeth in relation to masticatory excursion.

The author subscribes to the following premises, which are quoted and credited to their authors:

1. "The condyles do not rotate from fixed centers."—Norman Bennett (1908)
2. "The movements of the condyle are controlled by the movements or occlusion of the teeth."—Martin Dewey (1918)
3. "The condyles do not describe true paths but travel in the wake of the cusp paths."—D. D. Campbell (1918)
4. "The mandible is not a lever of the third class in any masticatory movement."—G. H. Wilson (1921)
5. "The teeth and jaws function during mastication in the manner of a naturally specialized concave-convex mill."—H. H. Boyle (1936)

The bibliography of this book takes the form of a very complete index of authors and shows thorough work on the part of Dr. Boyle in the preparation and publication of his work. The subtitle calls our attention to the fact that it is an investigation into the physical attributes and mechanical principle of the dental function. It should be of great interest in the scientific practice of dentistry because it clearly recognizes that an intimate knowledge of each integral part of the masticatory machine is vital to the proper appreciation of its nature.

There is material in the book which will appeal to persons with almost any scientific

interest in dentistry, for it deals nicely with theories concerning oral anatomy, orthodontics, prosthodontics and periodontics. Many of the statements made, as the author says, will be in the nature of a review of various theories and premises relating to the dental function and, for this reason, may provoke the reader to do further reading and studying in this connection. The illustrations are very well done.

James H. Pearce

ORAL REHABILITATION

By Jerome M. Schweitzer. First edition. 1161 pages with 1157 illustrations. Index. Price $20. St. Louis, C. V. Mosby Co., 1951.

"The main purpose in attempting a text of this nature is to present and to evaluate, in terms of the lowest common denominator, the different approaches that have already been made by men in the various specialties, especially of medicine and dentistry. . . . I have endeavored to present many theories and many different mechanical techniques which are used in complete occlusal reconstruction. . . . There is no one theory or one method of treatment. All theories and all methods have good and bad in them. We should extract the good and make use of it."

Thus, in part, Dr. Schweitzer introduces one of the most massive and imposing dental textbooks to appear in many years. Of its 41 chapters, 26 are devoted to studies of the temporomandibular joint. The remaining 15 chapters deal with occlusion and its related subjects.

Few books that have appeared in the dental literature have done such a thoroughgoing job of combing the writings and expressions of opinion in such a large field. It is a monumental review of the literature on its subject. Anyone who has written even a small textbook will readily appreciate the onerous drudgery involved merely in the physical mechanics of handling such a bulk of writings and illustrations. That it consumed 20 years could never be doubted.

There is one objection, however, to a book written in such encyclopedic fashion, and that is that it may fall short of being a definitive textbook and become a bewildering mass of opinions and fancies sandwiched between concrete evidence and scientific fact. "In studying this text," to quote again from the introduction, "the reader may sometimes be confused because of what will appear to be contradictions. This author is also confused because clinically these contradictions present themselves daily."

Some readers may feel impelled to raise a question as to which investigations are important and what makes them so. Does the mere fact that a certain investigator has written several articles and read several papers before scientific societies make his investigations important? Let us take a concrete example: Much space is devoted, in this book, to the writings of certain men who have purported to show that disturbances of hearing may occur because the eustachian tube is compressed by a distal displacement of the condyle of the mandible. Farther on, several pages are given to quotations from an article by Harry Sicher, among which we find: "A glance at the skull of a wet specimen should suffice to dispel any hope that acoustic disturbances could be explained by a compression and a degeneration of the cartilaginous part of the eustachian tube by the condyle of the mandible. There is not the remotest relation between the cartilaginous tube and the temporomandibular articulation."

The book is smoothly written, logically arranged, beautifully printed, and surprisingly easy to read. The vast number of illustrations show great care and skill in selection and their reproduction is almost uniformly excellent. Credit is given by the author to his two sons, both also dentists, and to his wife for drawing and retouching the figures.

Any student or practitioner of oral rehabilitation will find this book a gold mine of useful and practical knowledge and instruction. He may have to "pan" for the gold occasionally, but it is there and well worth the search.

Warren Willman

A CLINICAL STUDY OF THE PERIODONTAL TISSUES OF THE UPPER INCISORS IN TWO AGE GROUPS

By Arne Fosberg. Translated by Victor Braxton. Acta Odontologica Scandinavica, Vol. IX, Supplementum 8. 105 pages with 21 figures and 58 tables. Bibliography. No price listed. Stockholm, Sweden, Trycheri A.-B. Thule, 1951.

The author examined 101 subjects with a median age of 24.3 years and 102 subjects with a median age of 72.0 years, to determine the degree of pathologic process involving the investing tissues of their upper incisor teeth.

The mean depth of the gingival pockets at various well-selected measuring points around the teeth were greater for the older group. Deeper pockets were also found in the mouths

of the older group when the investing tissues were free of apparent gingivitis. Longer visible crowns, measured from the biting surfaces of the gingivae were also noted in the older group despite the fact that the anatomic crown had been shortened by attrition. The reduction through attrition of the anatomic crown length did not keep pace with the resorption of the alveolar crest so that the portion of the tooth not imbedded in the jaw was longer in the older age group. The distance from the enamel margin to the bone was found to be greatest for the older group.

In the presence of gingivitis there appeared a consistently greater depth of pocket and distance between the alveolar margin and enamel margin than was the case with non-inflamed gingiva.

The evidence presented seems to substantiate the over-all conclusion that in the older group the alveolar margin, the base of the pockets and the free gingival margin were on the average situated further apically than in the younger group, whether the gingival tissue was inflamed or not.

G. R. Lundquist

BASIC BIOLOGY OF MAN

By G. Kasten Tallmadge. First edition. 244 pages with 16 line illustrations. Index. Price $3. New York, Random House, Inc. 1952.

Doctor Tallmadge's work is written with charm and clarity. He has been so prominently identified with this science that he is qualified to speak with authority on the subject. His descriptions are so clear and easily understood that the book becomes easy and interesting reading. The text is illustrated with 16 diagrammatic sketches, and wherever possible the use of technical terms has been avoided.

The author explains the principles, processes and all the relationships within the human organism, from the simple cell to the formation and functions of the tissues, the skin, the locomotor apparatus, the digestive, circulatory, respiratory, urinary and reproductive systems.

The volume could be used readily in a non-professional education, in which precision in detail is not necessarily emphasized. It also can be highly recommended for lay reading, as an authoritative guide to the structure and functions of the human body. It is a carefully edited work, well printed.

E. Alan Lieban

AN INTRODUCTION TO MATERIA MEDICA AND PHARMACOLOGY

By Elsie E. Krug and Hugh Alister McGuigan. Sixth edition. 612 pages with 37 text illustrations and 10 color plates. Price $4.25. St. Louis, C. V. Mosby Co., 1951.

This text is very well written and covers the field of materia medica and pharmacology rather fully. However, it will probably be of very little use in dentistry since it is written for the specific purpose of training student nurses. There is some possibility of its use for courses in materia medica and pharmacology for students in dental hygiene, but it has great limitations even in this connection because it is so completely slanted to nursing and medical problems. For example, only one page is devoted to mouthwashes and dentifrices, while long chapters are given over to such subjects as "Pharmacology as Related to the Digestive System—the Circulatory System—the Reproductive System" which are of little importance or interest to the hygienist.

The chapter on "History of Materia Medica" is interesting, accurate, and well written, but again one finds almost complete absence of those facts which would be of greatest interest to the student of dentistry or dental hygiene. The only reference to the discovery of anesthesia consists of one sentence on page 565 which reads as follows, "In 1842 Dr. Crawford W. Long of Georgia first used ether as a general anesthetic and in 1847 Sir J. T. Simpson used chloroform for the same purpose." No reference or credit is given to Horace Wells for his discovery of nitrous oxide anesthesia nor to William T. G. Morton who independently discovered the use of ether as an anesthetic and publicized his work before Long made any announcement of his discovery.

The last chapter in the book provides an adequate coverage of legislation pertaining to drugs. However the same information can be found in *Accepted Dental Remedies* or any one of several textbooks which are available in dental pharmacology and therapeutics.

While this text will undoubtedly serve a very useful purpose in schools of nursing, it cannot be recommended either for the teaching of students of dentistry or of dental hygiene nor can it be recommended as a reference book for the practicing dentist.

F. D. Ostrander

Deaths

Anderson Boyce C., Jr., Huntsville, Texas; School of Dentistry, University of Texas, 1952; died November 6; aged 35.

Bailey, Arthur S., Lakewood, N. J.; School of Dentistry, University of Pennsylvania, 1915; died November 16; aged 61.

Beard, Clarence W., Waynesboro, Pa.; School of Dentistry, University of Pennsylvania, 1903; died October 18.

Beswick, T. Clawson, Upper Darby, Pa.; School of Dentistry, University of Pennsylvania 1898; died November 12.

Blais, Raymond, Holyoke, Mass.; Baltimore College of Dental Surgery, University of Maryland, 1939; died November 16; aged 40.

Cameron, Dan U., Chicago; Philadelphia Dental College, 1897; died December 10; aged 80.

Campbell, Frank H., Canonsburg, Pa.; School of Dentistry, University of Pittsburgh, 1916; died November 16; aged 61.

Changnon, Aylmer R., Kankakee, Ill.; Dental School, Northwestern University, 1897; died November 18; aged 78.

Cook, Albert A., Lansing, Mich.; Department of Dental Surgery, Detroit College of Medicine, 1907; died November 2; aged 71.

Cook, Alfred B., Lancaster, Wis.; Dental School, Marquette University, 1913; died November 14; aged 63.

Cook, Frank N., Pittsburgh; School of Dentistry, University of Pittsburgh, 1899; died November 20; aged 76.

Coutts, V. Charles, Vashon, Wash., School of Dentistry, North Pacific College of Oregon, 1924; died November 9; aged 51.

Dennis, Guy P. R., Ocean City, Md.; Baltimore College of Dental Surgery, 1919; died September 10; aged 56.

Devlin, James E., Boston; Dental School, Tufts College, 1896; died November 3,

Dick, George W., Sumter, S. C.; School of Dentistry, University of Pennsylvania, 1885; died October 28; aged 88.

Dintenfass, Hyman, Laurelton, N. Y.; College of Dental and Oral Surgery, New York, 1919; died November 19; aged 57.

Dunfee, John F., Scranton, Pa.; School of Dentistry, University of Pennsylvania, 1913; died October 31; aged 59.

East, Walter R., Cleveland; Ohio College of Dental Surgery, University of Cincinnati, 1912; died November 6; aged 62.

Eckert, Frederick E., San Francisco; College of Physicians and Surgeons, San Francisco, 1916; died November 18; aged 60.

Fears, William A., Roanoke, Va.; Dental Department, Meharry Medical College, 1923; died November 12.

Fischer, George W., New York; College of Dentistry, New York University, 1902; died October 5; aged 70.

Freeburn, Clair E., Johnstown, Pa.; Atlanta-Southern Dental College, 1929; died in July; aged 48.

Furbish, John A., Boston; Dental School, Harvard University, 1905; died October 4; aged 73.

Gahm, Adolph, Boston; Dental School, Harvard University, 1912; died June 27.

Gallico, J. Edward, Troy, N. Y.; Medico-Chirurgical College of Philadelphia, 1905; died October 25.

Geddie, Clarence H., La Grange, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1911; died July 19; aged 67.

Gerard, Reed H., Carmel, Calif.; Western Dental College, Kansas City, 1917; died November 12; aged 57.

Golding, Joseph W., Painesville, Ohio; School of Dentistry, Western Reserve University, 1912; died September 15; aged 65.

Goodsell, Edward H., Des Moines, Iowa; Chicago College of Dental Surgery, Loyola University, 1896; died September 28.

Goucher, William E., Jamestown, N. Y.; College of Dental Surgery, University of Michigan, 1894; died September 24; aged 80.

Graham, Fred A., Muncie, Ind.; College of Dental Surgery, University of Michigan, 1896; died October 7.

Grant, Harry L., Providence, R. I.; Dental School, Harvard University, 1898; died October 1; aged 86.

Grayson, Napoleon B., Birmingham, Ala.; Birmingham Dental College, 1915; died September 25; aged 69.

Greenwood, Robert G., Chicago; College of Dentistry, University of Illinois, 1921; died October 25; aged 55.

Griffith, William C., Johnstown, Pa.; Pennsylvania College of Dental Surgery, Philadelphia, 1892; died September 19; aged 82.

Groetzinger, Robert E., Chicago; Chicago College of Dental Surgery, Loyola University, 1925; died June 15; aged 52.

Haley, Harry W., Boston; Dental School, Harvard University, 1896; died September 25.

Hamlin, Joseph J., High Point, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1912; died October 21; aged 69.

Hargrave, Thomas J., Jackson, Miss.; School of Dentistry, Tulane University, 1910; died August 18; aged 67.

Harrison, Chester L., Anthony, Kan.; Kansas City-Western Dental College, 1927; died September 16; aged 49.

Hecht, Samuel N., Bayside, N. Y.; College of Dental and Oral Surgery, New York, 1923; died October 9; aged 52.

Hendricks, Abijah H., Seattle; School of Dentistry, North Pacific College of Oregon, 1905; died October 13.

Henneberry, Gerald E., Chicago; Chicago College of Dental Surgery, Loyola University, 1929; died August 10; aged 45.

Hixon, Edward D., Pell City, Ala.; Birmingham Dental College, 1907; died August 5.

Hodgkins, Nathan W., Wolfeboro, N. H.; School of Dentistry, University of Pennsylvania, 1903; died July 16; aged 72.

Holdren, John W., Casa Grande, Ariz.; School of Dentistry, Western Reserve University, 1944; died October 6; aged 34.

Hook, Frank, Coffeyville, Kan.; Louisville College of Dentistry of Centre College, 1907; died April 21; aged 80.

Ironmonger, J. Lynn, Hollywood, Calif.; College of Dentistry, University of Southern California, 1918; died October 7; aged 58.

Johannessen, Wilford N., Washington, D. C.; School of Dentistry, Georgetown University, 1923; died September 18; aged 59.

Johnston, Percy W., Shubuta, Miss.; Atlanta Dental College, 1908; died June 6; aged 70.

Jordan, M. Evangeline, Los Angeles; College of Dentistry, University of California, 1898; died October 10; aged 87.

Kaler, Lester A., Plymouth, Ind.; died October 22.

Kaplan, Harry, Brooklyn; New York College of Dentistry, 1918; died October 10; aged 57.

Keeler, Ralph H., New London, Conn.; Philadelphia Dental College, 1897; died May 18; aged 77.

Kerr, Donald E., Lincoln, Kan.; Kansas City-Western Dental College, 1936; died September 9; aged 39.

Keselring, Ormsby, Portsmouth, Ohio; College of Dentistry, Ohio State University, 1914; died July 9; aged 63.

Keyser, Sherman, Butte, Mont.; Dental School, Northwestern University, 1898; died September 24; aged 87.

King, Dudley G., Pittsburgh; College of Dentistry, Howard University, 1912; died July 19.

Krauser, Clarence A., Chicago; Chicago College of Dental Surgery, Loyola University, 1919; died November 7.

Kuschel, Charles C., Clarks Summit, Pa.; School of Dentistry, University of Pennsylvania, 1923; died October 4; aged 56.

Kyprie, Prodromus M., Detroit; College of Dental Surgery, University of Michigan, 1916; died November 3; aged 60.

Lewis, Stanley M., Dubuque, Iowa; College of Dentistry, University of Iowa, 1916; died June 23; aged 58.

Napier, Edward Y., Nashville, Tenn.; School of Dentistry, Vanderbilt University, 1916; died October 25; aged 59.

O'Brien, Vincent W., Chicago; Dental School, Northwestern University, 1919; died November 10; aged 53.

Oldaker, James L., Chicago; Chicago College of Dental Surgery, Loyola University, 1927; died September 30; aged 60.

Olfson, George R., Chicago; Chicago College of Dental Surgery, Loyola University, 1918; died October 25; aged 57.

Parker, Painless, San Francisco; School of Dentistry, Temple University, 1892; died November 8; aged 80.

Parkins, Charles F., Detroit; Department of Dental Surgery, Detroit College of Medicine, 1909; died October 28; aged 67.

Payne, Ernest C., Shelburne Falls, Mass.; School of Dentistry, University of Pennsylvania, 1903; died October 31; aged 71.

Pearce, B. Herbert, York, N. Y.; died August 27.

Phelps, Frederick W., East Hartford, Conn.; Baltimore College of Dental Surgery, University of Maryland, 1925; died October 14; aged 62.

Plummer, Joseph H., Chicago; College of Dentistry, University of Illinois, 1906; died in November; aged 76.

Popkins, Harry M., Jackson Heights, N. Y.; died October 30.

Taylor, William F., Fond du Lac, Wis.; College of Dentistry, University of Illinois, 1903; died May 15.

Wintersteen, Calvin R., Mifflinville, Pa.; Pennsylvania College of Dental Surgery, 1898; died September 5; aged 84.

Wood, Harry C., Taunton, Mass.; died November 6.

Wright, Glen E., North Manchester, Ind.; Indiana Dental College, 1905; died October 18; aged 72.

Wright, Ivan W., St. Marys, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1907; died July 2; aged 70.

Yeilding, H. LeRoy, Los Angeles; Birmingham Dental College, 1912; died in November; aged 68.

Zimmerman, Paul B., Johnstown, Pa.; School of Dentistry, University of Pittsburgh, 1922; died May 19.

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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
222 East Superior Street, Chicago 11, Illinois
WHitehall 4-6730

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Fourth Annual Session	Sept. 28-Oct. 1, 1953	Cleveland
Ninety-Fifth Annual Session	Nov. 8-11, 1954	Miami
Ninety-Sixth Annual Session	Oct. 17-20, 1955	San Francisco

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 9-11	Montgomery	F. A. Finney, Jr.	1045 Forrest Ave., Gadsden
Alaska	July 12-16	Juneau	J. D. Smith	Box 134, Juneau
Arizona	Apr. 23-25	Tucson	E. M. Scott	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 5-8	Little Rock	D. M. Hamm	White Bldg., Clarksville
California	Apr. 13-15	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	Apr. 20-22	Los Angeles	C. A. Moss	903 Crenshaw Blvd., Los Angeles
Colorado	Oct. 4-7	Colorado Springs	W. R. Humphrey	724 Republic Bldg., Denver
Connecticut	May 20-23	Hartford	E. S. Arnold	17 Linnard Rd., W. Hartford
Delaware			J. J. Ficca	2130 Lancaster Ave., Wilmington
District of Columbia	Mar. 15-18	Washington	K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Apr. 19-22	St. Petersburg	C. T. Brown	602 Citizens Bldg., Tampa 2
Georgia	Oct. 18-21	Atlanta	J. W. Yarbrough	Bibb Bldg., Macon
Hawaii	June 24-27	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu 17
Idaho	June 18	Sun Valley	J. F. Julian	206 Rogers Bldg., Idaho Falls
Illinois	May 12-14	Peoria	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 18-20	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 4-6	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 10-13	Kansas City, Mo.	F. A. Richmond	861 Brotherhood Bldg. Kansas City
Kentucky	Apr. 7-9	Louisville	A. B. Coxwell	1976 Douglass Blvd., Louisville
Louisiana	Apr. 29-May 2	New Orleans	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 25-27	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland	May 4-6	Baltimore	E. L. Pessagno, Jr.	19 Medical Arts Bldg., Baltimore 1
Massachusetts	May 3-6	Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	Apr. 20-23	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Feb. 22-25	Minneapolis	C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	Apr. 26-29	Jackson	H. M. Campbell	102 Professional Bldg., Tupelo
Missouri	May 10-13	Kansas City	E. D. Suggett	201 Merchants Bank Bldg., Jefferson City
Montana	May 7-9	Missoula	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska	May 11-13	Lincoln	F. A. Fierson	1112 Federal Securities Bldg., Lincoln
Nevada	May 4, 5	Las Vegas	J. E. Ahlstrom	1150 Arizona, Boulder City
New Hampshire	June 11-14	Bretton Woods	F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 22-24	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 24-27	Albuquerque	J. S. Eilar	Suite 7, Medical Arts Square, Albuquerque
New York	May 12-15	New York	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 17-20	Pinehurst	B. N. Walker	608 Liberty Life Bldg., Charlotte
North Dakota	May 24-27	Fargo	J. H. Lunday	302 Black Bldg., Fargo
Ohio	Nov. 8-11	Columbus	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 19-22	Tulsa	D. Robertson	434 N. W. 13th St., Oklahoma City
Oregon	Mar. 2-4	Portland	H. C. Fixott, Jr.	Medical Dental Bldg., Portland
Panama Canal Zone			F. D. Buckley	Box 293, Rodman
Pennsylvania	May 20-22	Atlantic City, N. J.	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico			A. Quiñones	San German
Rhode Island			E. L. Bessette	1745 Broad St., Cranston 5
South Carolina	June	Greenville	J. R. Owings	7 Medical Court, Greenville
South Dakota	May	Rapid City	E. W. Elmen	Sioux Falls
Tennessee	May 11-14	Knoxville	W. L. McCulley	Brown Bldg., Cleveland

State	Date	Place	Secretary	Address
Texas	May 10-14	Houston	W. Ogle	3607 Gaston Ave., Dallas
Utah	Apr. 27-29	Salt Lake City	K. L. Dedekind	914 Medical Arts Bldg., Salt Lake City
Vermont	May 17-19	Woodstock	W. J. Reardon	Rutland
Virginia	May 4-6	Roanoke	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	June 18-20	Yakima	F. J. Dingler	1502 Medical-Dental Bldg., Seattle
West Virginia	July 19-22	White Sulphur Springs	A. B. Drake	506 West Virginia Bldg., Huntington 1
Wisconsin	Apr. 6-9	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming		Casper	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 14*	Birmingham	N. E. Allen	Du Bose Bldg., Selma
Alaska	July 6-11	Fairbanks	J. H. Geyer	209 Goldstein Bldg., Juneau
Arizona			R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 22-26	Little Rock	H. O. Weatherly	205 Halter Bldg., Conway
California	Feb. 2	San Francisco	K. I. Nesbitt	507 Polk St., San Francisco 2
	July 27			
	June 22	Los Angeles		
Colorado	June 22-26	Denver	C. K. Phillips	724 Republic Bldg., Denver 2
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia	June 1-5	Washington	W. T. Birthright	1835 Eye St., N. W., Washington 6
Florida	July 6-14*	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			S. H. Yarbrough	Medical Arts Bldg., Columbus
Hawaii			H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho	June 24-26	Boise	W. K. Adams	1624 Arlington, Caldwell
Illinois			W. A. McKee	503 Wood Bldg., Benton
Indiana	June 16-19*	Indianapolis	C. A. Frech	504 Broadway, Gary
Iowa	May 25-29*	Iowa City	H. M. Willits	719 Roshek Bldg., Dubuque
Kansas	June 1-4	Kansas City, Mo.	G. L. Teall	Box 71, Hiawatha
Kentucky	June 8-11	Louisville	R. I. Todd	Western Union Bldg., Richmond
Louisiana	June 1-5	New Orleans	R. C. Steib	833 Maison Blanche Bldg., New Orleans
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 8-10	Baltimore	H. Levin	3429 Park Heights Ave., Baltimore 15
Massachusetts			R. A. Barrette	Rm. 33 State House, Boston
Michigan	June 8-12	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota	June 14-18	Minneapolis	F. A. Larson	1632 Washington St., N. E., Minneapolis
Mississippi	June 16-18	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
Missouri	June 8-13	St. Louis Kansas City	R. R. Rhoades	414 Central Trust Bldg., Jefferson City
Montana	July 13-16	Helena	V. J. Quinn	Box 865, Helena
Nebraska			H. E. Weber	1210 Federal Securities Bldg., Lincoln
Nevada			G. C. Steinmiller	Suite 6, Masonic Temple, P. O. Box 2473, Reno
New Hampshire			D. J. Freese	4 Wall St., Concord
New Jersey	June 1, 2**††‡	Philadelphia	W. A. Wilson	150 E. State St., Trenton 8
	June 10, 11**	New York		
	June 3-5§	Trenton		
New Mexico	June 22-25	Santa Fe	J. J. Clarke, Sr.	Artesia
New York			D. W. Beier	23 S. Pearl St., Albany 7
North Carolina	June 22-25	Chapel Hill	F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	July 13-17	Fargo	A. B. Crabtree	Ellendale
Ohio	June 18-20‡‡	Columbus	H. B. Smith	322 E. State St., Columbus
	June 22-24**			
	June 20††			
Oklahoma			J. B. Cole	706 Asp St., Norman
Oregon	June 15-18*	Portland	F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania			A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			L. C. Coll	Box 9156, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			T. C. Sparks	1315 Pickens St., Columbia
South Dakota			O. Isaak	Tyndall
Tennessee			F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas			R. T. Weber	312 Capital National Bank Bldg., Austin
Utah			M. W. Merrill	820 N. University Ave., Provo
Vermont	June 22-24	Burlington	F. A. Reid	Windsor
Virginia	June 8, 9‡‡	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond 19
	June 8-12†			

State	Date	Place	Secretary	Address
Washington			J. B. Keifer, Jr.	510 Cobb Bldg., Seattle
West Virginia	June 22-24*	West Liberty	C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin	June 15-19*	Milwaukee	S. F. Donovan	Tomah
Wyoming			W. A. Hocker	212 O & S Bldg., Casper

*Dentistry and dental hygiene.
**Dental clinical examinations.
†Dental examinations.
††Hygiene clinical examinations.
§Dental written examinations.
‡‡Hygienists' examinations.
‡Hygiene written examinations

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Denture Prosthetics	Apr. 12-19	Los Angeles	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
American Academy of Dental Medicine	June 26-28	Washington, D. C.	W. M. Greenhut Secy.	124 E. 84th St., New York
American Academy of Implant Dentures	Feb. 7	Chicago	P. S. Loechler Secy.	215 Tenth St., S. E., Rochester, Minn.
American Academy of Oral Pathology	Feb. 8	Chicago	J. L. Bernier Secy.	Armed Forces Institute of Pathology, Washington, D.C.
American Academy of Restorative Dentistry	Feb. 7, 8	Chicago	A. G. James Secy.	409 N. Camden Drive, Beverly Hills, Calif.
American Association of Dental Schools	Mar. 23-25	Philadelphia	M. W. McCrea Secy.	Baltimore College of Dental Surgery, Dental School, University of Maryland, Baltimore 1
American Association of Endodontists	Feb. 7, 8	Chicago	V. B. Milas Secy.	2559 W. 63rd St., Chicago 29
American Association of Orthodontists	Apr. 26-30	Dallas, Texas	F. A. Squires Secy.	Medical Centre, White Plains, N. Y.
American Board of Orthodontics	Apr. 22-26	Dallas, Texas	C. E. Martinek Secy.	661 Fisher Bldg., Detroit 2
American Board of Prosthodontics	Feb. 1-7	Indianapolis	I. R. Hardy Secy.	Tufts College Dental School, 136 Harrison Ave., Boston 11
American Denture Society	Feb. 7, 8	Chicago	A. L. Roberts Secy.	Aurora National Bank Bldg., Aurora, Ill.
American Society for the Advancement of General Anesthesia in Dentistry	Mar. 23	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York
Arpa Internationale, Thirteenth Congress	July 13-19	Geneva, Switzerland	J. N. Nally Secy. Gen., Com. on Organization	8, rue de Saussure, Geneva, Switzerland
Berkshire Conference in Periodontology and Oral Pathology	June 14-18	Boston	I. Glickman Dir.	Tufts College Dental School, 136 Harrison Ave., Boston 11
Chicago Dental Society	Feb. 8-11	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago 2
Cincinnati Dental Society	Mar. 22-24	Cincinnati	P. H. McMullen Exec. Secy.	123 E. Sixth St., Cincinnati 2
Council on Dental Education, Dental Aptitude Tests	Mar. 6, 7		S. Peterson Secy.	222 E. Superior St., Chicago 11
Fédération Dentaire Internationale	July 26-Aug. 1	Oslo, Norway	G. H. Leatherman Hon. Secy.	35 Devonshire Place, London W 1, England
Greater Philadelphia	Feb. 4-6	Philadelphia	R. Adams Secy.	Bellevue-Stratford Hotel, Suite 337, Broad and Walnut Sts., Philadelphia 2
International Academy of Oral Dynamics	Mar. 15	Washington, D. C.	J. J. Greeves Pub. Chm.	1801 K St., N. W., Washington, D. C.
International Association for Dental Research	Mar. 20-22	Philadelphia	E. H. Hatton Secy.	311 E. Chicago Ave., Chicago 11
National Board of Dental Examiners	Feb. 10, 11		G. J. Casey Secy.	222 E. Superior St., Chicago 11
Northeastern Society of Orthodontists	Mar. 9, 10	New York	O. Jacobson Secy.	35 W. 81st St., New York
Pacific Coast Society of Prosthodontists	Apr. 18, 19	Santa Monica, Calif.	A. W. Spaulding Secy.	4350 11th Ave., Los Angeles
Seattle District Dental Society	Feb. 14	Seattle	R. J. Wallace Secy.	715 General Insurance Bldg., Seattle 5
Southeastern Society of Oral Surgeons	Mar. 6, 7	Birmingham, Ala.	C. F. Landels Secy.	316 James Bldg., Chattanooga, Tenn.
Southern Academy of Oral Surgery	Mar. 21, 22	Atlanta, Ga.	R. F. Sullivan Secy.	118 E. Jones St., Savannah, Ga.
Thirteenth Australian Dental Congress	June 1-5	Brisbane	A. H. Jackson Secy.	New Zealand Chambers, 334 Queen St., Brisbane, Australia

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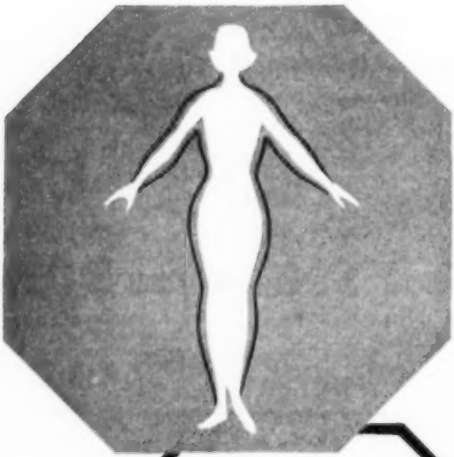

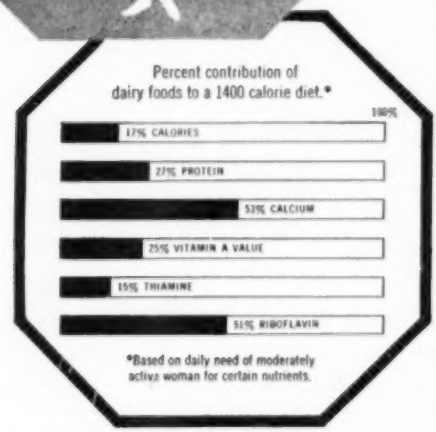

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[1]Cederquist, D. C., Brewer, W. D., Beegle R. M., Wagoner, A. N., Dunsing, D., and Ohlson, M. A. Weight reduction on low-fat and low-carbohydrate diets. I. Clinical results and energy metabolism. J. Am. Diet. Assn. *28*:113 (Feb.) 1952.

[2]Young, C. M. Weight reduction using a moderate-fat diet. I. Clinical responses and energy metabolism. J. Am. Diet. Assn. *28*:410 (May) 1952.

[3]Brewer, W. D., Cederquist, D. C., Williams, B., Beegle, R. M., Dunsing, D., Kelley, A. L., and Ohlson, M. A. Weight reduction on low-fat and low-carbohydrate diets. II. Utilization of nitrogen and calcium. J. Am. Diet. Assn. *28*:213 (Mar.)'52.

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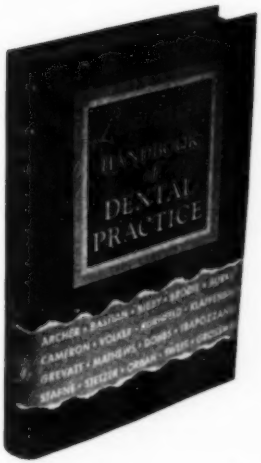

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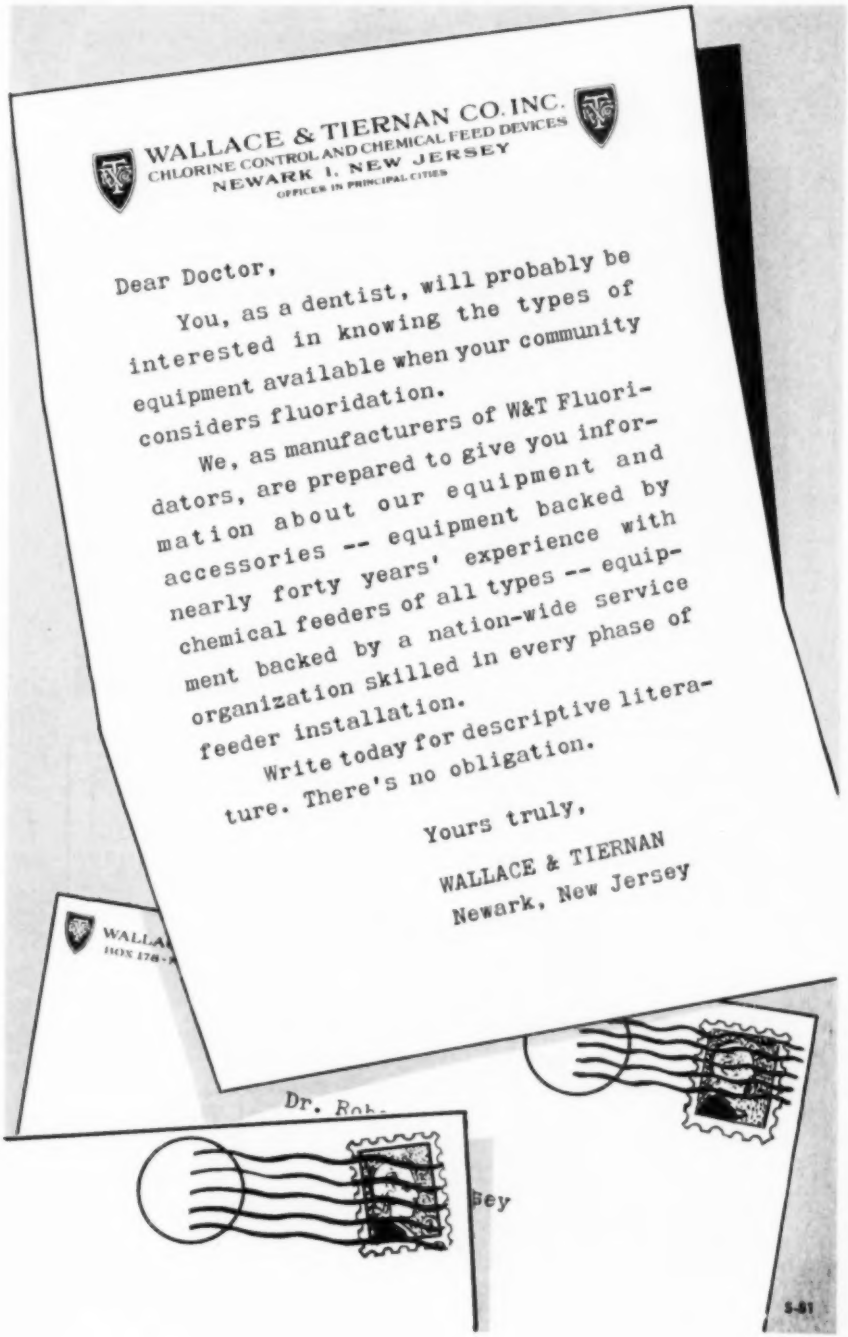

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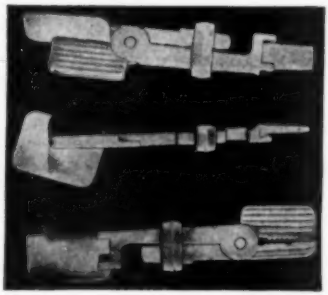

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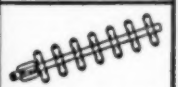

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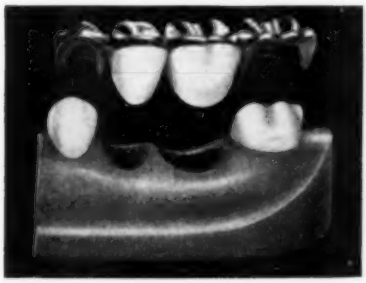

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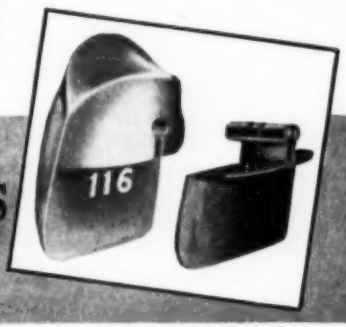

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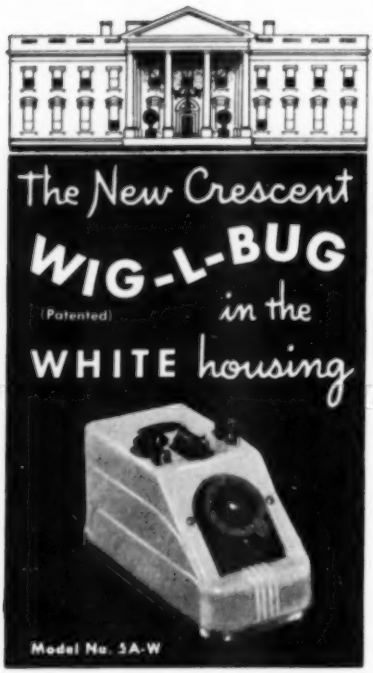

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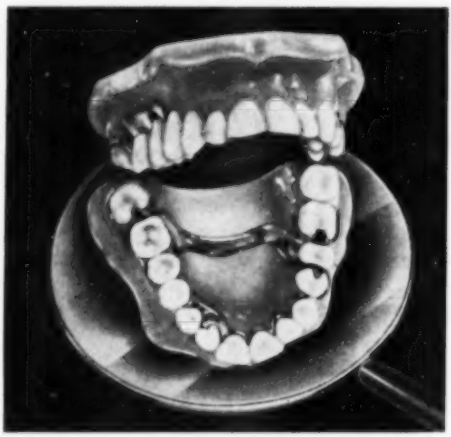

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Only when oranges are eaten whole can *all* the benefits of the fruit be realized, especially the desirable effects of the protopectins which, through their colloidal, chemical, and antibacterial properties, help to maintain a desirable intestinal environment, promote better absorption of vitamins and minerals, and effect more normal evacuation.

Approximate Typical Analyses of Edible Portion and Strained Juice of California Oranges. Amounts shown are per 100 Gm. of fresh weight.

Constituents	Fresh Fruit, peeled	Strained Juice
Calories	48	46
Protein (including free amino acids*)[1,4]	1.0 Gm.	0.9 Gm.
Fat	0.3 Gm.	0.2 Gm.
Dextrose and Levulose	4.0 Gm.	4.6 Gm.
Sucrose	4.0 Gm.	4.6 Gm.
Protopectins and Pectin	1.0 Gm.[2]	0.1 Gm.
Citric acid	1.0 Gm.	1.0 Gm.
Malic acid	0.1 Gm.	0.1 Gm.
Carotenes (pro-vitamin A)	1.0 mg.	0.16 mg.
Thiamine (vitamin B_1)	0.2 mg.	0.086 mg.
Riboflavin	0.1 mg.	0.032 mg.
Niacin	0.5 mg.	0.24 mg.
Pantothenic acid	0.5 mg.	0.21 mg.
Pyridoxine	0.2 mg.	0.08 mg.

Constituents	Fresh Fruit, peeled	Strained Juice
Inositol	400.0 mg.	200.0 mg.
Biotin	0.004 mg.	0.002 mg.
Folic acid	0.004 mg.	0.002 mg.
Ascorbic acid (vitamin C)	60.0 mg.	57.0 mg.
Flavanoids (vitamin "P")[3]	1.0 Gm.	0.1 Gm.
Minerals (total ash)	0.5 Gm.	0.4 Gm.
Calcium	50.0 mg.	11.6 mg.
Phosphorus	30.0 mg.	20.0 mg.
Iron	1.0 mg.	0.25 mg.
Sodium	9.0 mg.	6.0 mg.
Potassium	150.0 mg.	170.0 mg.
Magnesium	10.0 mg.	13.0 mg.
Sulfur	10.0 mg.	8.0 mg.
Chlorine	6.0 mg.	6.0 mg.
Alkalinity of ash, expressed as K_2CO_3	0.3 Gm.	0.3 Gm.

* Free amino acids include alanine, arginine, asparagine, cystaine, serine, proline, and glutamic, aspartic and gamma-aminobutyric acids. Glutathione is also present.

1. Underwood, J. C., and Rackland, L. B., Food Research, in press.
2. Miner Laboratories, Chicago, Illinois. (1952)
3. Davis, W. B., Determination of Flavanones in Citrus Fruits, Anal. Chem. 19:476 (July) 1947.
4. Underwood, J. C., and Rackland, L. B., Arch. Biochem., in press.

All others from figures taken from the literature and data compiled by Research Department, Sunkist Growers. From known have been made to reflect the composition of the entire edible portion in those cases where the original data referred to screened juice.

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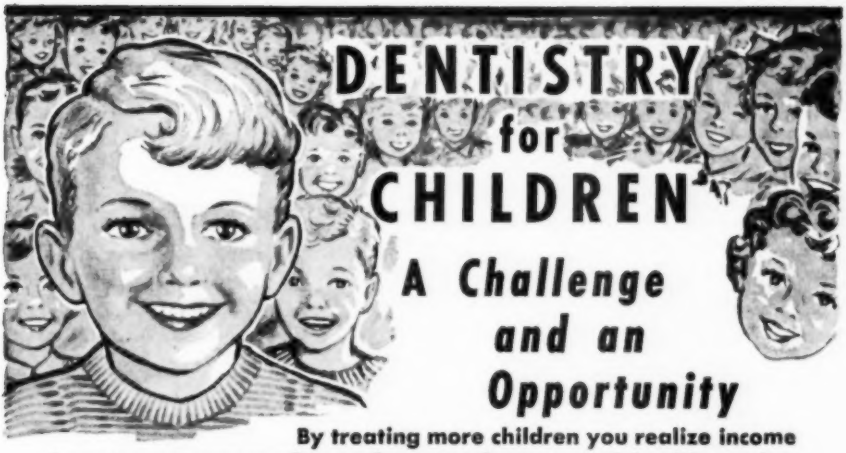

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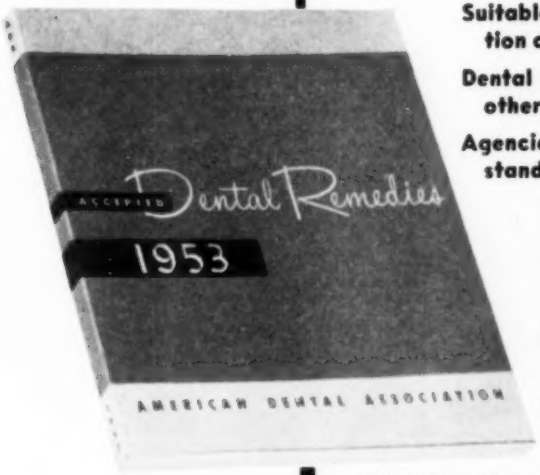

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CONNECTICUT—For sale. Long established good practice. Downtown New Haven. No evening hours. Completely equipped with almost new, modern equipment. Low overhead. Owner being recalled into service. Will introduce. Address A.D.A. Box No. 189.

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FLORIDA—Dental practice grossing $30,000 yearly in best downtown Miami location. Two new Ritter equipped operating rooms complete with x-ray. Office beautifully furnished. Air conditioned. Complete $13,500. Owner must move to another area. Direct replies to 628-9 DuPont Bldg., Miami, Fla. Phone 82-4434.

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ILLINOIS—Established dental practice, new left-handed equipment, x-ray. Business corner in Austin district. Call evenings Columbus 1-9101 or direct replies to Dr. Raymond Greenberg, 20 S. Central Ave., Chicago, Ill.

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ILLINOIS—Columbia, Ill. Dental practice and equipment. Fourteen miles south of St. Louis. Direct replies to Dr. Michael J. Reiser, 9929 Manchester Rd., St. Louis, Mo.

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INDIANA—Because of the very recent death of Dr. Roy C. Shields, his well established dental practice is for sale. This is a well equipped, two operating room office, located in a modern building in downtown South Bend. This is one of the best practices in northern Indiana and is immediately available. The price is right and the patients are waiting. Direct replies to Mrs. Roy C. Shields, 1313 E. Wayne St., South Bend, Ind.

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PENNSYLVANIA—Fully equipped modern dental office, practice and single masonry home in suburban Philadelphia area. Owner is back in school studying specialty. Direct replies to Dr. A. F. Macchia, 2016 Jenkintown Rd., Glenside, Pa.

WISCONSIN—For sale. Two-chair office in city of 2,300. No competition. Mostly new equipment, recently redecorated. Reason: owner leaving for the service. Address A.D.A. Box No. 190.

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CALIFORNIA—Periodontist. Excellent opportunity with established practice. Immediate income without any investment. Must have California license. Address A.D.A. Box No. 188.

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CONNECTICUT — Permanent associate wanted for lucrative general practice. Profit-sharing basis with partnership possibilities. Five-chair modern bungalow office. Excellent opportunity. Give full details as to professional background and military status. Address A.D.A. Box No. 191.

●

FLORIDA—Associate badly needed in general practice. No contract signing required but prefer associate to remain at least one year. All expenses paid. Excellent opportunity for right man. Give personal details and enclose photograph. Address A.D.A. Box No. 192.

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FLORIDA—Wanted: Dental hygienist. Well established dentist wishes to contact Florida licensed dental hygienist for her professional services in his office. Address A.D.A. Box No. 193.

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IDAHO—Dentist badly needed in County seat, population 3,000. 10,000 population drawing area. Stable community of farming, stock raising, mining, lumbering. Excellent hunting, fishing, recreation. Direct replies to Dr. H. L. Olson, Chamber of Commerce, Grangeville, Idaho.

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INDIANA—Wanted: Hygienist in office where present hygienist has well established practice. Any applicant will be given opportunity to correspond with her personally. Direct replies to Dr. W. S. Flack, Major-Laing Bldg., Mishawaka, Ind.

●

MARYLAND—Wanted: Resident in oral surgery and dental intern beginning July 1, 1953. Applicants for residency must have postgraduate or previous hospital training. Recent graduate accepted for internship. Applicants must be graduates of accredited dental schools. Training in all surgical and related subjects. Approved by A.D.A. Direct replies to Executive Director, Sinai Hospital, Baltimore 5, Md.

●

MICHIGAN—Dentist; draft exempt and under 40 years of age, for public health work in Michigan. Starting salary rate $4,500 per year. Michigan license not required provided the individual is a graduate of an accredited United States dental school and is licensed in another state. Direct inquiries to Child Health Division, Children's Fund of Michigan, 660 Frederick St., Detroit 2.

●

MICHIGAN—Dental hygienist; Michigan licensed, for public health work in Michigan. Starting rate $3,600 per year. Direct inquiries to Child Health Division, Children's Fund of Michigan, 660 Frederick St., Detroit 2.

MISSOURI—Associate wanted for orthodontic practice, male or female. Eventual partnership considered. Must have graduate training in edgewise technic. Excellent opportunity. Must be free from military service. Direct replies giving background and qualifications. Address A.D.A. Box No. 194.

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NEBRASKA—Wanted: Dentist with Nebraska license to take over my established practice while I'm in the service for about 18 months. Direct replies to Dr. R. J. Prendergast, Arnold, Neb.

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VIRGINIA—Draft-exempt dentist wanted to take over completely equipped, two-chair, modern office with x-ray; located in southern West Virginia mining camp. Present practitioner to enter military service for two years. Address A.D.A. Box No. 195.

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VIRGINIA—Wanted: Dentists under 40 for State Dental Program. Correctional program for rural elementary school children. Temporary license can be arranged until next meeting of Examining Board. Salary $5,600-$6,608. Modern portable dental equipment or dental trailer furnished. Automobile is necessary. Write State Department of Health, Richmond 19, Va.

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NEW YORK—Ideal professional plot in Brooklyn, 200x105, East side of Nostrand Avenue between U and V Sts. Well populated and still growing area. Terms. Direct replies to Nathan Schlanger, 170 Broadway, New York, N. Y.

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Army dentist released in January desires to purchase practice in N. Y. State. Will associate with prospect of purchasing. Queens County preferred. Address A.D.A. Box No. 198.

●

Oral surgeon—July, desires to affiliate with group or association. Three years' general practice. Four years university and hospital training. Competent to administer intravenous anesthesia. Military completed. Massachusetts license. Take any State Board. Address A.D.A. Box No. 199.

●

Dentist, 1947 graduate, to be released from Air Force May, 1953. Extensive experience in exodontics and prosthetics. Desires golden opportunity in North Carolina, Georgia, South Carolina or Tennessee. Direct replies to Dr. Harry Dickey, Moody Air Force Base, Valdosta, Ga.

●

Dentist desires to buy practice in or near Boston, preferably with owner remaining for short period. Also interested in rental of office space. Direct replies to Dr. Louis Limmelforb, 1050 Havana St., Aurora, Colo.

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Dentist, age 29, being released from service, desires to purchase practice in southern Maine or Connecticut. One year's internship and four years' experience in private practice. Address A.D.A. Box No. 200.

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Oral surgeon, draft exempt, age 40; thoroughly trained and experienced in all office and hospital procedures, including general anesthesia, licensed New York and Connecticut, desires association with surgeon, institution, group. Address A.D.A. Box No. 201.

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Dentist, 1947 graduate, OKU; desires full or part time ethical association or will maintain practice of dentist leaving for military service. Southern California. Will be released from military service March. Address A.D.A. Box No. 203.

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Recent graduate, veteran of World War II, family man with Wisconsin license, desires opportunity to locate or associate. Any arrangement considered. Address A.D.A. Box No. 204.

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Dentist returning from service, desires location, practice, or association with option to purchase. Available immediately. New York license. Five years' experience. Long Island or Westchester preferred. Address A.D.A. Box No. 185.

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Capable young dentist desires association or partnership with other ethical practitioner. Will consider buying good practice. Five years' experience general practice; three in own office, two in Air Force. Especially capable with children; can handle minor oral surgery. Licensed Virginia and New York. Available February 1. Draft exempt. Address A.D.A. Box No. 182.

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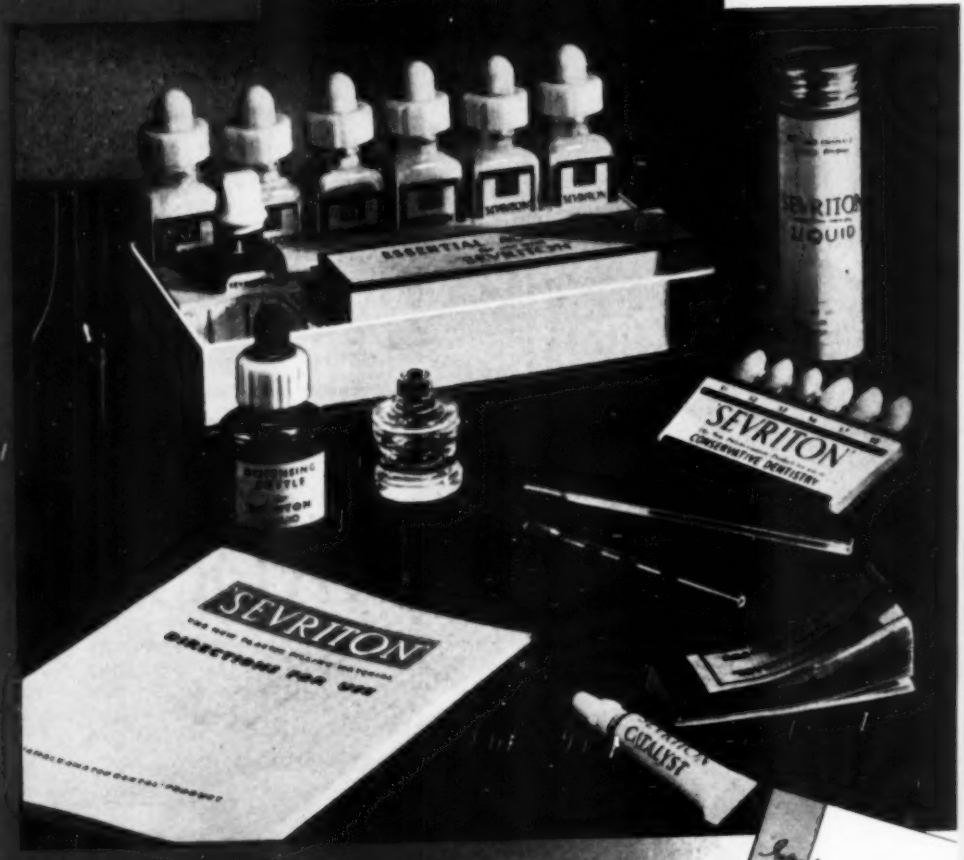

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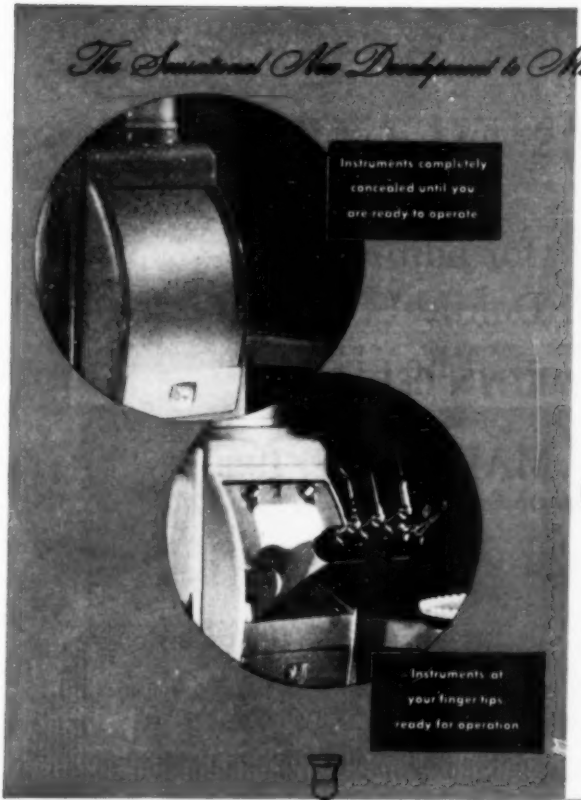

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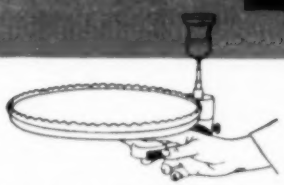

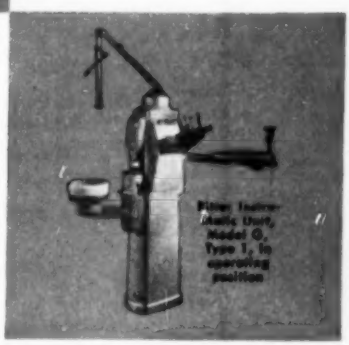

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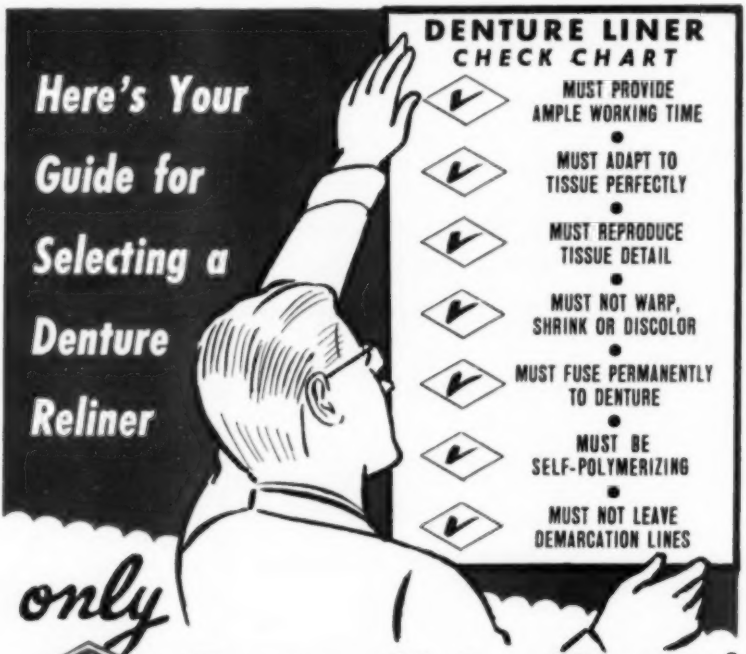
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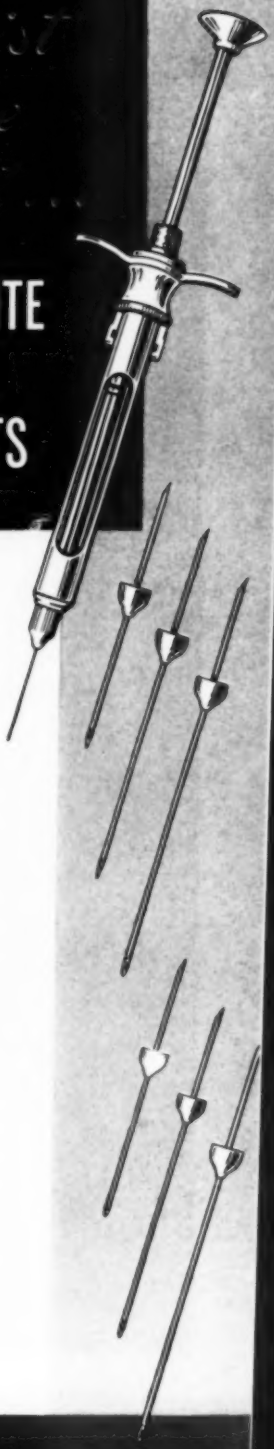

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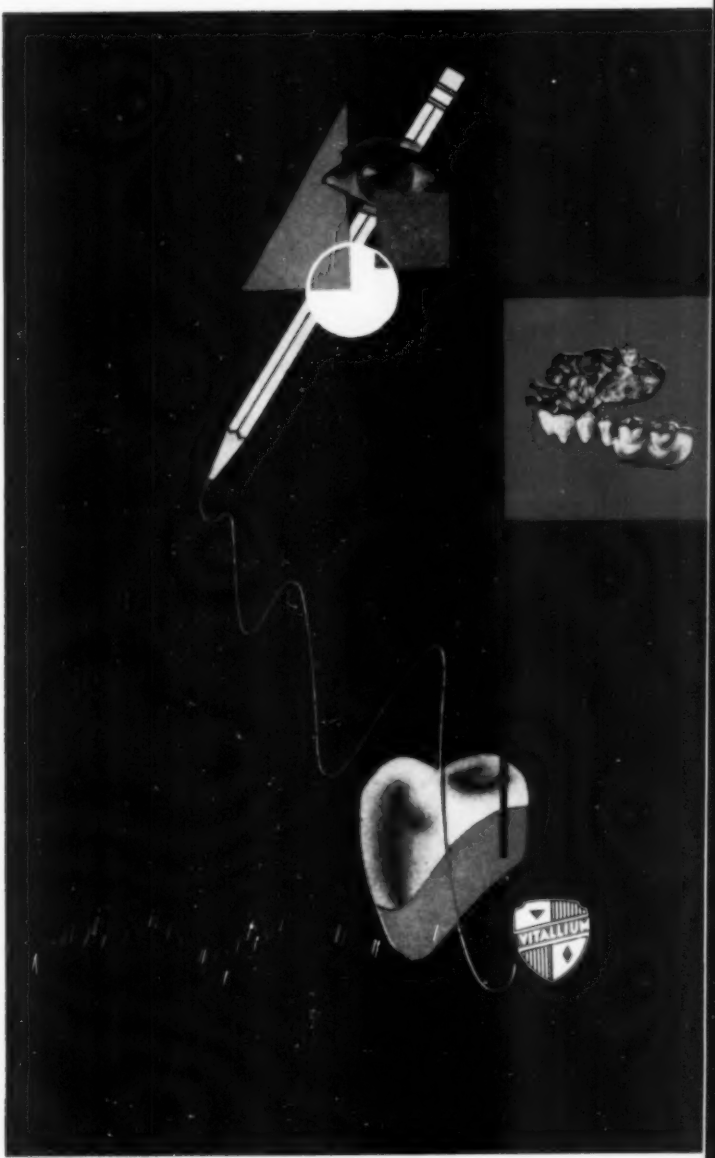
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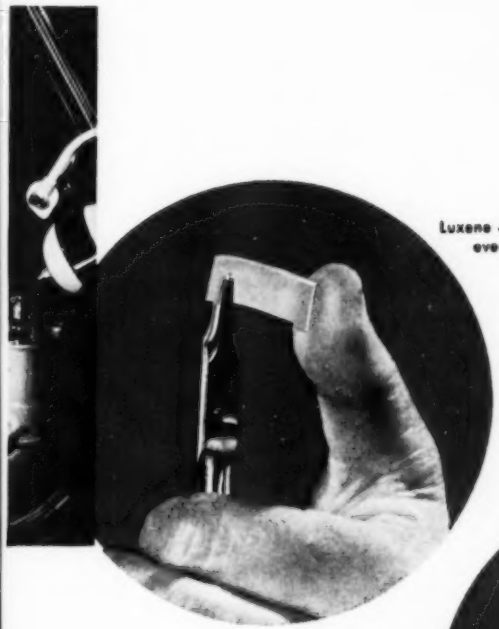

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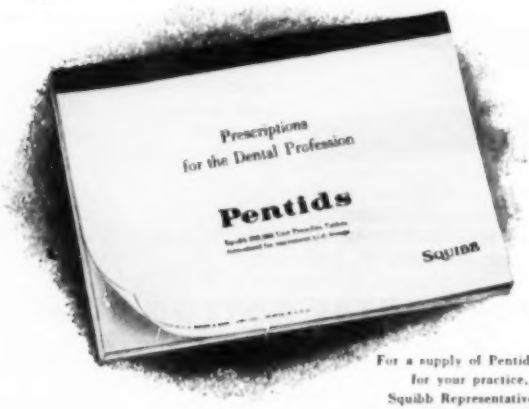
1. Keefer, C. S., Postgrad. Med. 9:101, Feb. 1951
2. Flippin, H. F., and Israel, H. L., Med. Clin. North Amer. 34:1653, Nov. 1950



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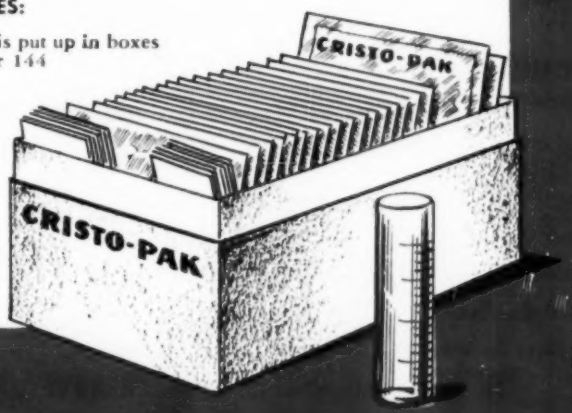

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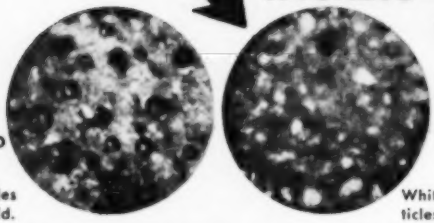

CONVENTIONALLY FIRED PORCELAIN

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These photomicrographs were made under polarized light at 200X. Reproduced here reduced one-third.

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